Enantioselective copper (II) catalysed (4+1) cycloaddition of aza-*o*-quinone methides and bromomalonates. Facile access to enantioenriched indolines

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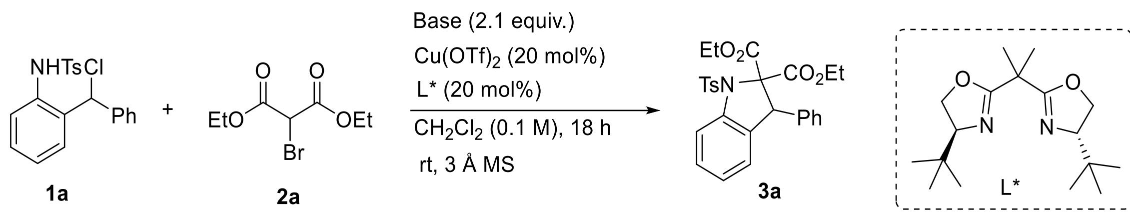
General information

All manipulations of air and moisture sensitive species were performed under argon atmosphere unless otherwise stated. Glassware was dried with a heat gun under vacuum. Dry solvents, where necessary, were dried by a MBRAUN MB-SPS-800 apparatus. Starting materials sourced from commercial suppliers were used as received unless otherwise stated. Reactions were monitored using analytical TLC plates (Scharlab; silica gel 60 F254, 0.20 mm) visualized by UV-light at 254 nm. Silica gel grade 60 (230-400 mesh, Silicycle Inc.) was used for column chromatography. ^{1}H, ^{13}C and ^{19}F NMR spectra were recorded on either Mercury VX-300, Unity 300, Bruker Avance Neo 400 or Unity 500 MHz Varian spectrometers at room temperature. Chemical shifts are given in ppm (δ) downfield from tetramethylsilane, with calibration the residual chloroform signals (δ_H = 7.26 ppm for ^{1}H NMR and δ_C = 77.16 ppm for ^{13}C NMR). Coupling constants (J) are in Hertz (Hz) and signals are described as follows: s, singlet; d, doublet; t, triplet; q, quartet; quin, quintet; sex, sextet; sep, septet; bs, broad singlet; dd, double doublet; ddd, double doublet of doublets; tt, triple triplet; dq, double quartet and m, multiplet. High resolution analyses (HRMS) were performed on an Agilent 6210 time of-flight LC/MS. Optical rotations were obtained using a PerkinElmer 341 polarimeter and concentrations are given in g/100mL. The enantiomeric ratio was measured on a JASCO HPLC.

1. The detail of the full screening

1.1. Table S1. Screening of bases

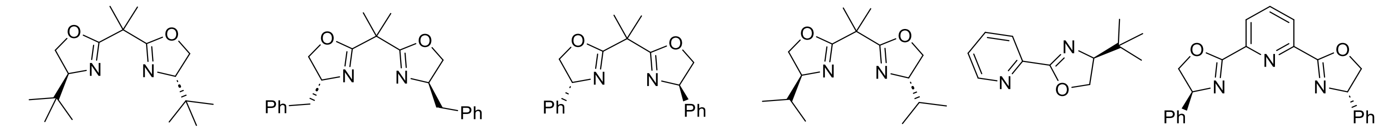


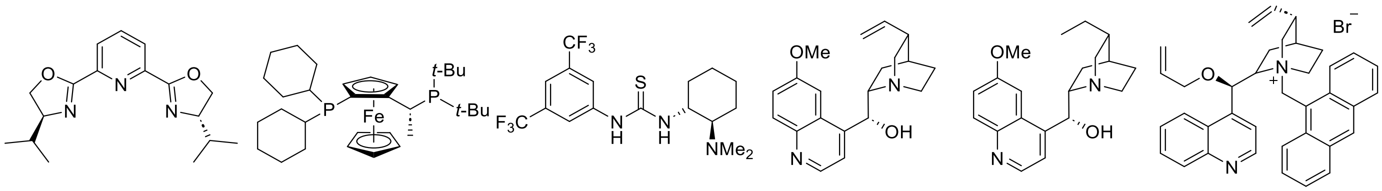
Entry	Base	Yield	e.r.
1	DIPEA	complex mixture	ND
2[a]	DIPEA	complex mixture	ND
3	Cs_2CO_3	complex mixture	ND
4	K_2CO_3	complex mixture	ND
5	Et_3N	Product: Impurity (1:1)	ND
6	K_3PO_4	complex mixture	ND
7	DBU	complex mixture	ND
8	DABCO	complex mixture	ND
9	DMAP	complex mixture	ND
10	**NaH (60%)**	**68%**	**50:50**

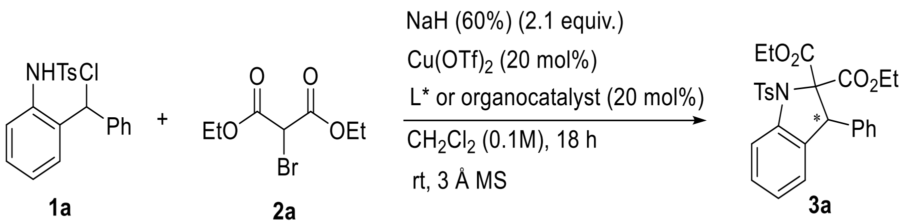
The reactions were run on a 0.1 mmol scale: substrate **1a** (1.0 equiv.), diethyl 2-bromomalonate (3.0 equiv.), base, (2.1 equiv.), $Cu(OTf)_2$ (20 mol%), L* (20 mol%) in CH_2Cl_2 (0.1 M) and the reaction mixture was stirred at room temperature for 18 h. The enantiomeric ratio was determined by analytical chiral HPLC. ND: no determined.

[a] Reaction carried out at 0 ºC.

1.2. Table S2. Screening of chiral ligands and organocatalysts



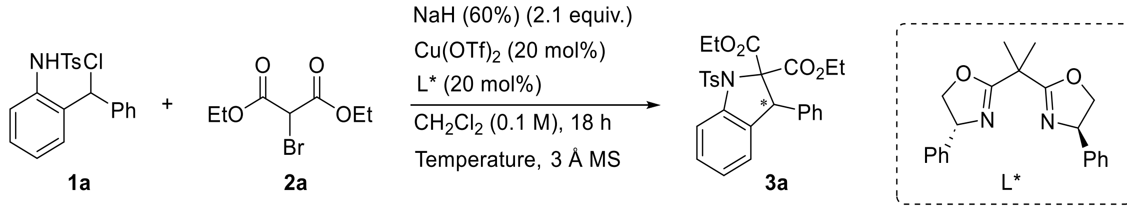




Entry	Ligand/Organocatalyst	Yield	e.r.
1	I	68%	50:50
2[a]	I	41%	50:50
3[b]	I	24%	55:45
4	II	67%	55:45
5	**III**	**66%**	**58:42**
6	IV	77%	50:50
9	V	63%	53:47
7	VI	72%	50:50
8	VII	74%	50:50
10	VIII	53%	50:50
11[c]	IX	81%	50:50
12[c]	X	88%	50:50
13[c]	XI	80%	50:50
14[c]	XII	66%	50:50

The reactions were run on a 0.1 mmol scale: substrate (1.0 equiv.), diethyl 2-bromomalonate (3.0 equiv.), base, (2.1 equiv.), $Cu(OTf)_2$ (20 mol%), L*/organocatalyst (20 mol%) in CH_2Cl_2 (0.1M) and the reaction mixture was stirred at room temperature for 18 h. The enantiomeric excess has been determined by chiral HPLC. [a] Reaction carried out without catalyst and chiral ligand. [b] Reaction carried out at -78 ºC. [c] Reaction carried out in the absence of $Cu(OTf)_2$.

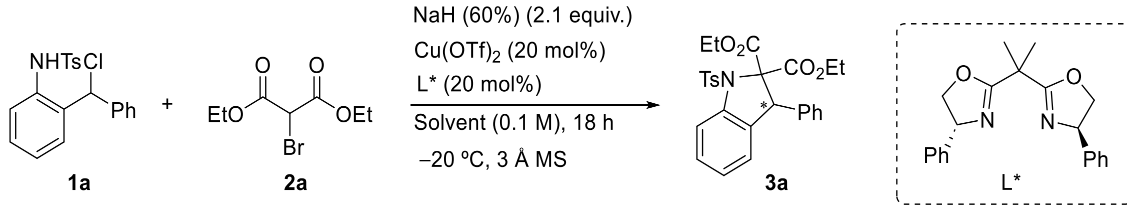
1.3. Table S3. Screening of temperatures



Entry	Temperature	Yield	e.r.
1	rt	66%	58:42
2	0 ºC to rt	41%	62:38
3	**-20 ºC**	**30%**	**68:32**
4	-50 ºC	31%	67:33
5	-78 ºC to rt	17%	58:42

The reactions were run on a 0.1 mmol scale: substrate **1a** (1.0 equiv.), diethyl 2-bromomalonate (3.0 equiv.), NaH (2.1 equiv.), $Cu(OTf)_2$ (20 mol%), L* (20 mol%) in CH_2Cl_2 (0.1 M) and the reaction mixture was stirred at different temperatures for 18 h. The enantiomeric ratio was determined by analytical chiral HPLC.

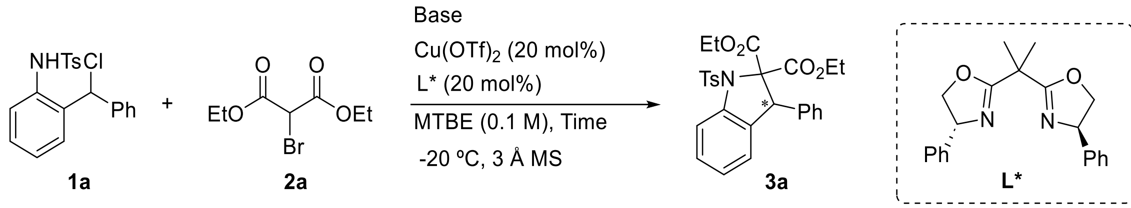
1.4. Table S4. Screening of solvents



Entry	Solvent	Yield	e.r.
1	CH_2Cl_2	30%	68:32
2	THF	43%	56:44
3	DCE	61%	62:38
4	MeOH	10%	52:48
5	Acetone	58%	61:39
6	Toluene	65%	76:24
7	Dioxane	51%	53:47
8	MeCN	20%	62:38
9	EtOAc	53%	69:31
10	DME	41%	56:44
11	Et_2O	52%	81:19
12	**MTBE**	**70%**	**89:11**

The reactions were run on a 0.1 mmol scale: substrate **1a** (1.0 equiv.), diethyl 2-bromomalonate **2a** (3.0 equiv.), NaH (2.1 equiv.), $Cu(OTf)_2$ (20 mol%), L* (20 mol%) in different solvents (0.1 M) and the reaction mixture was stirred at –20 ºC for 18 h. The enantiomeric ratio was determined by analytical chiral HPLC.

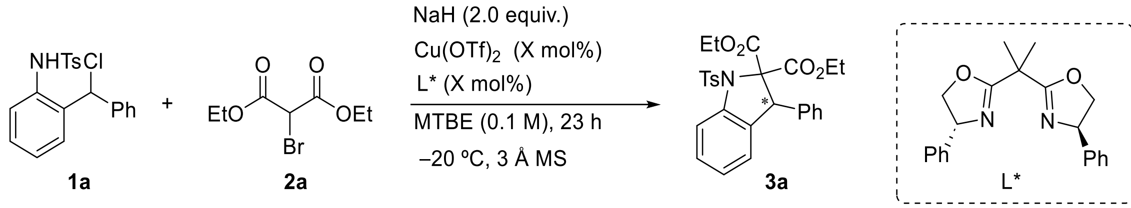
1.5. Table S5. Reproducibility tests



Entry	Base	Time	Yield	e.r.
1	NaH (60%)	18 h	65% / 58% / 70%	80:20 / 86:14 / 89:11
2[a]	NaH (60%)	18 h	55%	82:18
3	Cs_2CO_3	18 h	18% / 15%	96:4 / 96:4
4[b]	Cs_2CO_3	18 h	10%	95:5
5	NaH (90%)	18 h	45% / 58% / 61%	94:6 / 93:7 / 92:8
6	**NaH (90%)**	**23h**	**69%**	**95:5**
7	NaH (90%)	48h	41%	96:4

The reactions were run on a 0.1 mmol scale: substrate **1a** (1.0 equiv.), diethyl 2-bromomalonate (3.0 equiv.), base, (2.0 equiv.), $Cu(OTf)_2$ (20 mol%), L* (20 mol%) in MTBE (0.1 M) and the reaction mixture was stirred at –20 ºC for 18 h. The enantiomeric ratio was determined by analytical chiral HPLC. [a] Reaction carried out at 0.2 mmol scale. [b] Reaction carried out at –78 ºC.

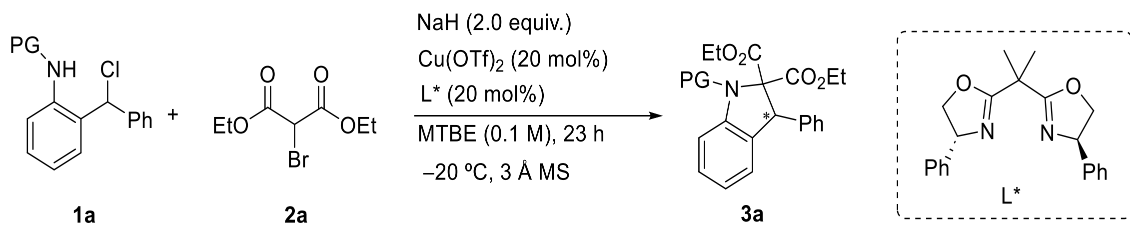
1.6. Table S6. Screening of catalyst loadings



Entry	Catalyst loading	Yield	e.r.
1	**20 mol%**	**69%**	**95:5**
2	15 mol%	45%	89:11
3	10 mol%	16%	86:14
4	5 mol%	11%	86:14

The reactions were run on a 0.1 mmol scale: Substrate **1a** (1.0 equiv.), diethyl 2-bromomalonate (3.0 equiv.), NaH, (2.0 equiv.), $Cu(OTf)_2$, L* in MTBE (0.1 M) and the reaction mixture was stirred at –20 ºC for 23 h. The enantiomeric ratio was determined by analytical chiral HPLC.

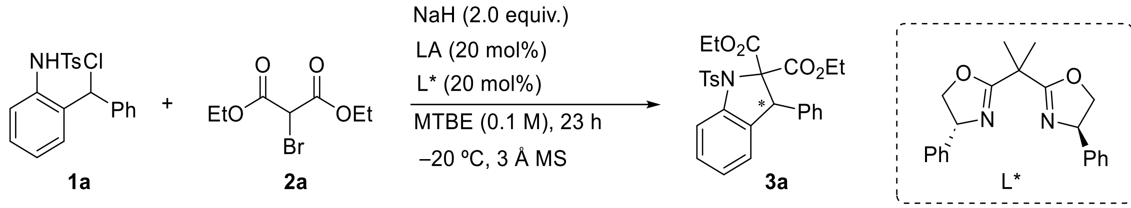
1.7. Table S7. Screening of protecting groups



Entry	Protecting group	Yield	e.r.
1	**Tosyl**	**69%**	**95:5**
2	Mesitylene	35%	68:32
3	Benzoyl	complex mixture	ND
4	Acetyl	complex mixture	ND

The reactions were run on a 0.1 mmol scale: Substrate **1a** (1.0 equiv.), diethyl 2-bromomalonate (3.0 equiv.), NaH, (2.0 equiv.), $Cu(OTf)_2$ (20 mol%), L* (20 mol%) in MTBE (0.1 M) and the reaction mixture was stirred at –20 ºC for 23 h. The enantiomeric ratio was determined by analytical chiral HPLC. ND: No determined .

1.8. Table S8. Screening of Lewis acids

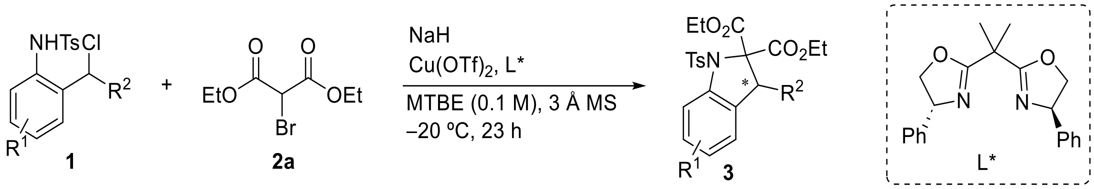


Entry	Lewis acid	Yield	e.r.
1	**$Cu(OTf)_2$**	**69%**	**95:5**
2	CuO	12%	48:52
3	$CuCl_2$	24%	55:45
4	$Cu(OAc)_2$	53%	60:40
5	$CuBr_2$	28%	51:49
6	$Cu(acac)_2$	21%	51:49
7	$Fe(OTf)_2$	37%	46:54
8	$Mg(OTf)_2$	63%	25:75

The reactions were run on a 0.1 mmol scale: Substrate **1a** (1.0 equiv.), diethyl 2-bromomalonate (3.0 equiv.), NaH, (2.0 equiv.), Lewis acid (20 mol%), L* (20 mol%) in MTBE (0.1 M) and the reaction mixture was stirred at –20 ºC for 23 h. The enantiomeric ratio was determined by analytical chiral HPLC.

2. Synthesis of chiral indolines

General procedure.

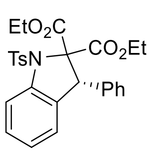


In a Schlenk flask $Cu(OTf)_2$ (7.2 mg, 20 mol%), L* (6.7 mg, 20 mol%) and pulverized 3 Å molecular sieves (32.0 mg) were added and 3 cycles vacuum/ argon were realised. Then, dry MTBE (1 mL, 0.1 M) was added and the suspension was stirred for 30 min at rt. The mixture was cooled down to –20 ºC and *N*-(*ortho*-chloromethyl)aryl amides (**1a-u**) (0.1 mmol, 1.0 equiv.), diethyl 2-bromomalonate **2a** (51.5 µL, 0.3 mmol, 3 equiv.) and NaH 90% (5.3 mg, 0.2 mmol, 2 equiv.) were added and the resulting mixture was stirred for 23 h at –20 ºC. The reaction progress was monitored by TLC (hexane/EtOAc). After the starting material was consumed, the reaction was quenched with NH_4Cl, extracted with DCM (x 3), dried with Na_2SO_4 and purified by column chromatography (hexane/EtOAc) to afford the corresponding products (**3a-u**). The enantiomeric ratio was determined using HPLC on a chiral stationary phase after a comparison with a racemic mixture.

Racemic reaction

In a Schlenk flask $Cu(OTf)_2$ (7.2 mg, 20 mol%) and pulverized 3 Å molecular sieves (32.0 mg/ 0.10 mmol) were added and 3 cycles vacuum/ argon were realised. Then, dry MTBE (1 mL, 0.1 M) was added and the suspension was stirred for 30 min at rt. The mixture was cooled down to –20 ºC and *N*-(*ortho*-chloromethyl)aryl amides (**1a-u**) (0.1 mmol), diethyl 2-bromomalonate (51.5 µL, 0.3 mmol, 3 equiv.) and NaH 90% (5.3 mg, 0.2 mmol, 2 equiv.) were added and the resulting solution was stirred for 23 h at –20 ºC. The reaction progress was monitored by TLC (hexane/EtOAc). After the starting material was consumed, the reaction was quenched with NH_4Cl, extracted with DCM (x 3), dried with Na_2SO_4 and purified by column chromatography (hexane/EtOAc) to afford the corresponding racemic products (**3a-u**).

Diethyl (*R*)-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3a)

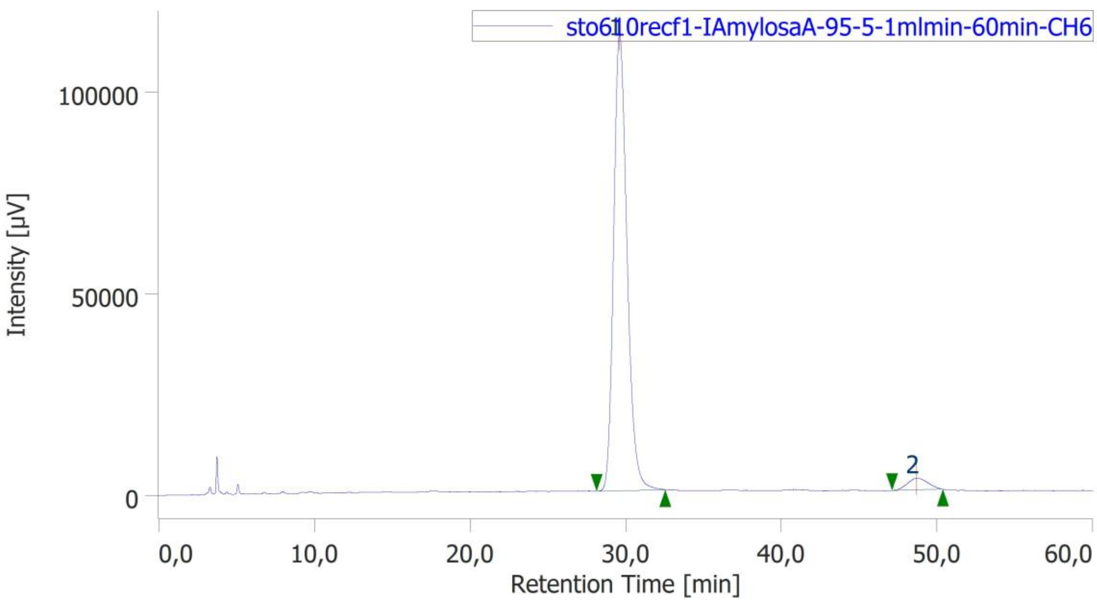


General procedure was followed to obtain **3a** as a white solid (34.1 mg, 69% yield). A 1.0 mmol scale reaction under the standard conditions was carried out to furnish **3a** (0.30 g, 61% yield). The enantiomeric ratio was found to be 96:4 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 95:5 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 29.600 min, tr (minor): 48.667 min. **M.p.:** 112-114 ºC. **R*f* =** 0.41 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ = +14 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.11 (d, *J* = 8.4 Hz, 2H), 7.33 – 7.26 (m, 5H), 7.17 – 7.11 (m, 2H), 7.06 – 6.92 (m, 4H), 5.40 (s, 1H), 4.39 (dq, *J* = 7.2, 1.4 Hz, 2H), 3.89 – 3.59 (m, 2H), 2.42 (s, 3H), 1.37 (t, *J* = 7.2 Hz, 3H), 0.92 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 168.8 (C), 165.2 (C), 144.1 (C), 141.9 (C), 138.2 (C), 137.9 (C), 129.9 (2 x CH), 129.6 (2 x CH), 129.5 (C), 128.8 (CH), 128.5 (2 x CH), 128.3 (2 x CH), 128.3 (CH), 125.9 (CH), 123.4 (CH), 113.1 (CH), 82.3 (C), 63.3 (CH_2), 62.4 (CH_2), 56.3 (CH), 21.7 (CH_3), 14.1 (CH_3), 13.5 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{27}H_{28}NO_6S$ $[M+H]^+$: 494.1637, found 494.1639.



Peak Information

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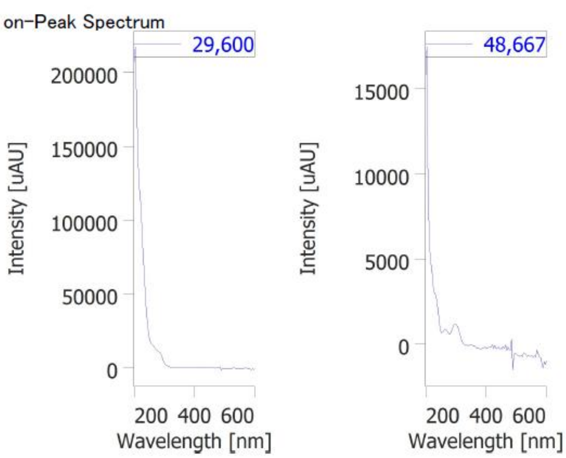
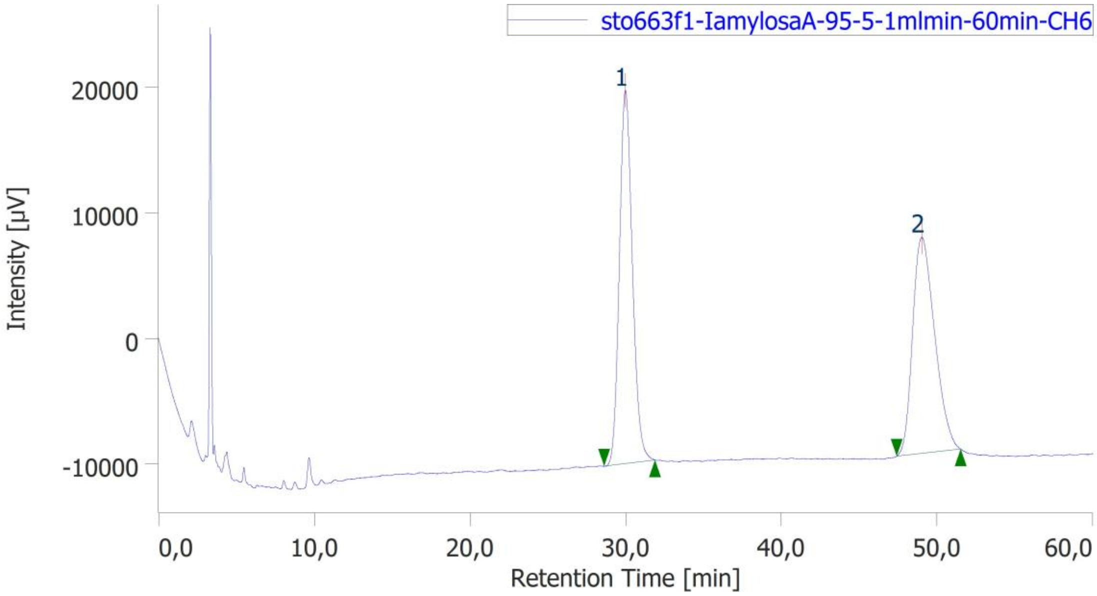
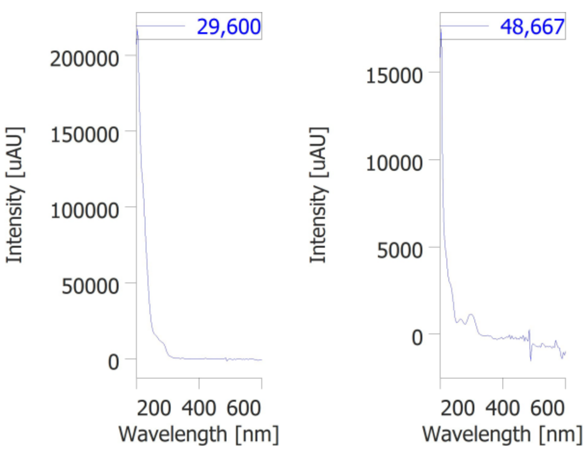
2	Unknown	6	48,667	263010	2884	3,738	2,483	N/A	6026	N/A	1,106	







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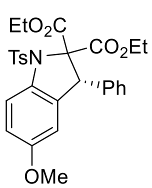
2	Unknown	6	49,007	1688172	17170	49,687	36,664	N/A	5570	N/A	1,309	

Diethyl (*R*)-5-methoxy-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3b)

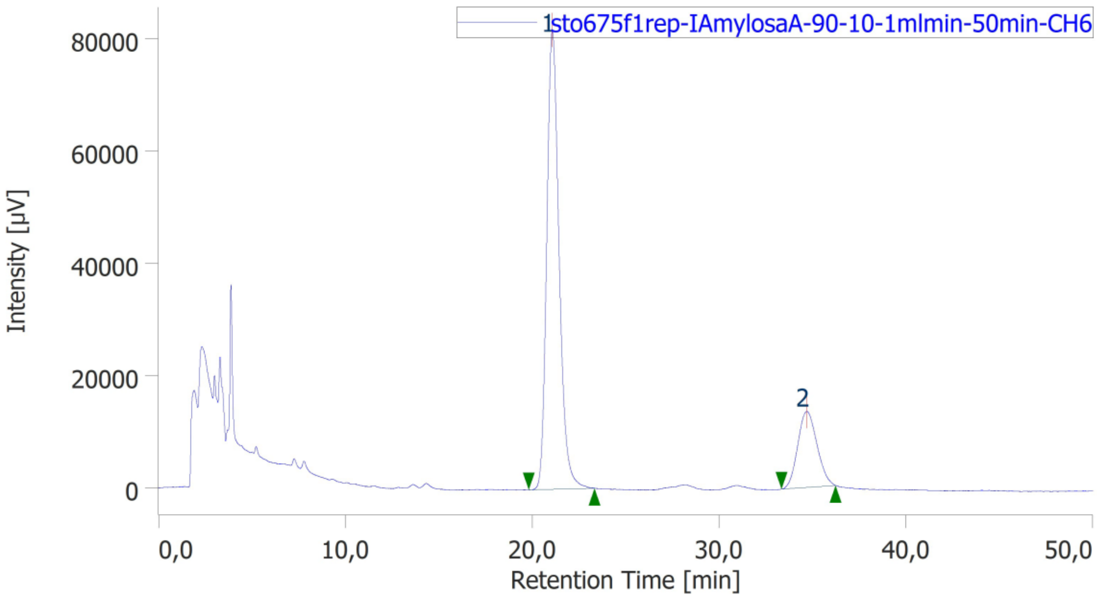


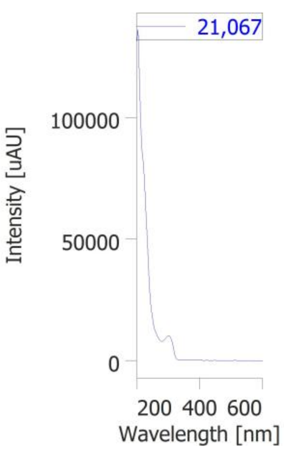
General procedure was followed to obtain **3b** as a white solid (27.8 mg, 53% yield). The enantiomeric ratio was found to be 79:21 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 21.067 min, tr (minor): 34.680 min. **M.p.:** 126-127 ºC. **R_f =** 0.25 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** +4 (c = 0.1, $CHCl_3$).

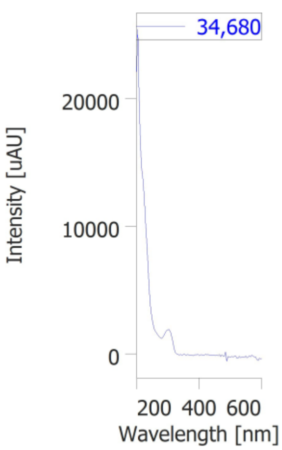
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.08 (d, *J* = 8.4 Hz, 2H), 7.34 – 7.23 (m, 5H), 7.10 – 6.97 (m, 3H), 6.70 (dd, *J* = 8.9, 2.8 Hz, 1H), 6.55 (d, *J* = 2.8 Hz, 1H), 5.36 (s, 1H), 4.38 (dq, *J* = 7.1, 1.4 Hz, 2H), 3.84 – 3.66 (m, 2H), 3.66 (s, 3H), 2.42 (s, 3H), 1.36 (t, *J* = 7.1 Hz, 3H), 0.91 (t, *J* = 7.1 Hz, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 168.9 (C), 165.2 (C), 156.4 (C), 144.0 (C), 138.0 (2 x C), 135.4 (C), 130.9 (C), 129.8 (2 x CH), 129.6 (2 x CH), 128.4 (2 x CH), 128.3 (2 x CH), 128.3 (CH), 114.3 (CH), 113.7 (CH), 111.5 (CH), 82.6 (C), 63.3 (CH$_2$), 62.4 (CH$_2$), 56.3 (CH), 55.8 (CH$_3$), 21.7 (CH$_3$), 14.0 (CH$_3$), 13.5 (CH$_3$).

HRMS (ESI-TOF): m/z calculated for $C_{28}H_{29}NNaO_7S$ [M+Na]$^+$: 546.1562, found 546.1556.







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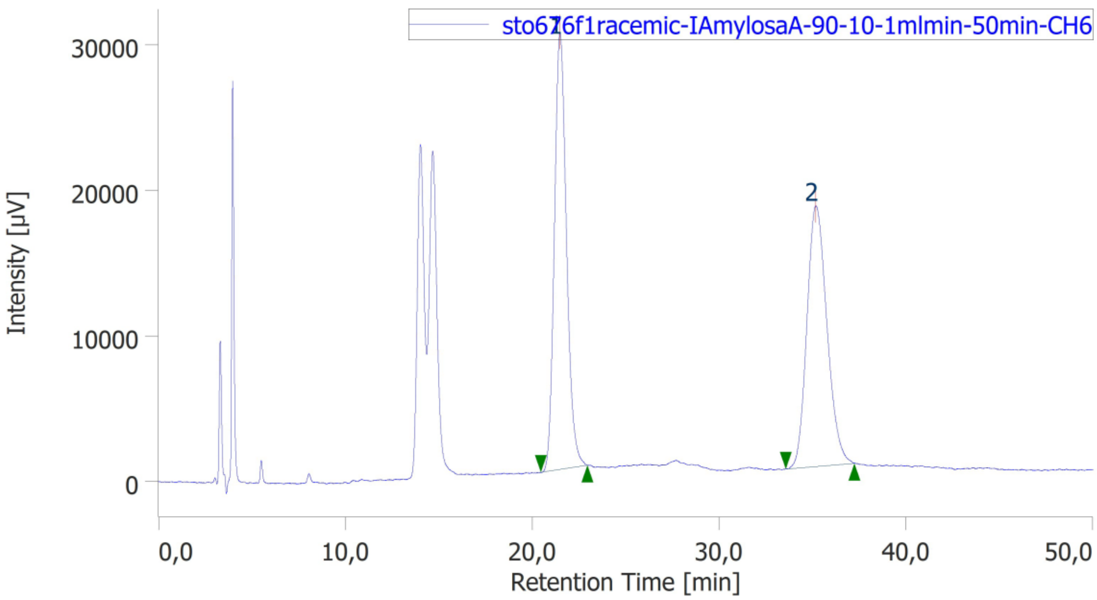
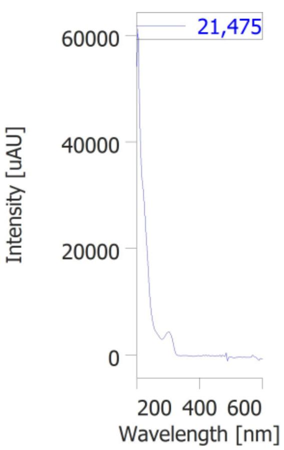
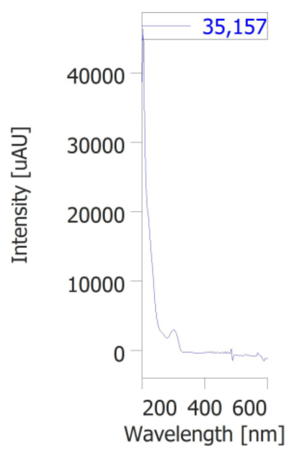
2	Unknown	6	34,680	967312	13530	20,615	14,208	N/A	5265	N/A	1,125	







Peak Information

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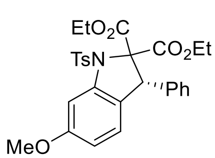
1	Unknown	6	21,475	1344615	30023	50,250	62,645	N/A	5434	8,785	1,195	
2	Unknown	6	35,157	1331253	17903	49,750	37,355	N/A	5159	N/A	1,213	

Diethyl (*R*)-6-methoxy-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3c)

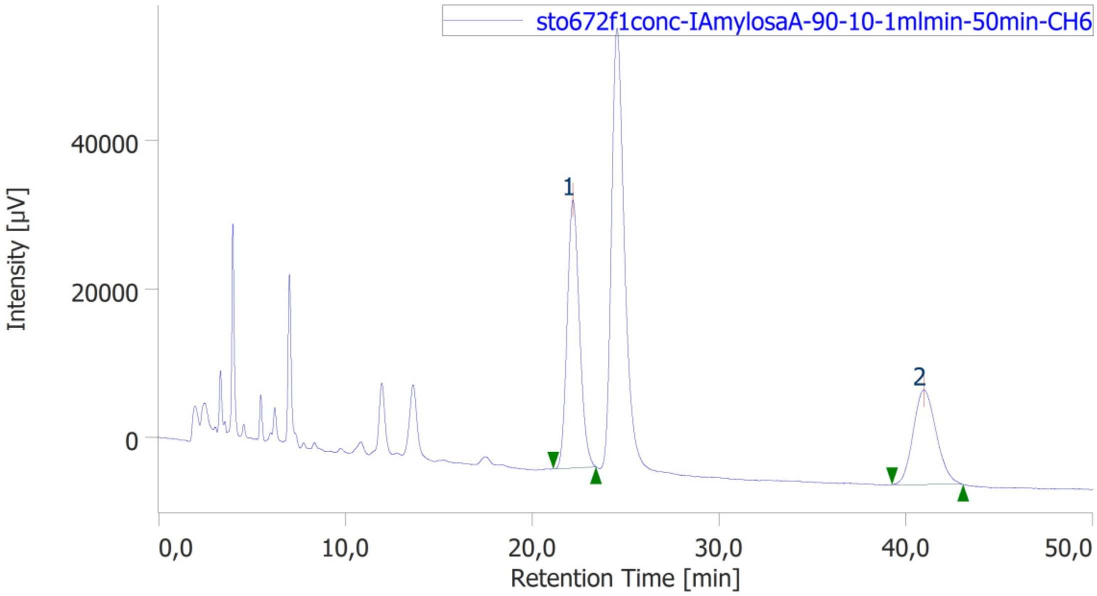


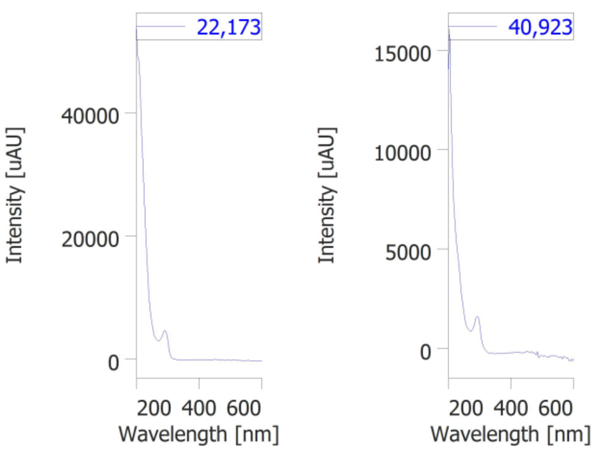
General procedure was followed to obtain **3c** as a white solid (29.9 mg, 57% yield). The enantiomeric ratio was found to be 60:40 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 22.173 min, tr (minor): 40.923 min. **M.p.:** 130-132 ºC. **R*f* =** 0.21 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** +5 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.11 (d, *J* = 8.4 Hz, 2H), 7.32 – 7.26 (m, 5H), 7.07 – 6.98 (m, 2H), 6.87 (d, *J* = 8.4 Hz, 1H), 6.73 (d, *J* = 2.3 Hz, 1H), 6.49 (dd, *J* = 8.4, 2.3 Hz, 1H), 5.32 (s, 1H), 4.39 (dq, *J* = 7.1, 1.3 Hz, 2H), 3.81 – 3.65 (m, 2H), 3.71 (s, 3H), 2.42 (s, 3H), 1.38 (t, *J* = 7.1 Hz, 3H), 0.91 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 168.8 (C), 165.2 (C), 160.5 (C), 144.2 (C), 143.0 (C), 138.7 (C), 137.9 (C), 129.8 (2 x CH), 129.7 (2 x CH), 128.5 (2 x CH), 128.3 (2 x CH), 128.2 (CH), 126.3 (CH), 121.4 (C), 108.9 (CH), 99.9 (CH), 83.1 (C), 63.3 (CH_2), 62.4 (CH_2), 55.7 (CH), 55.6 (CH_3), 21.7 (CH_3), 14.1 (CH_3), 13.5 (CH_3).

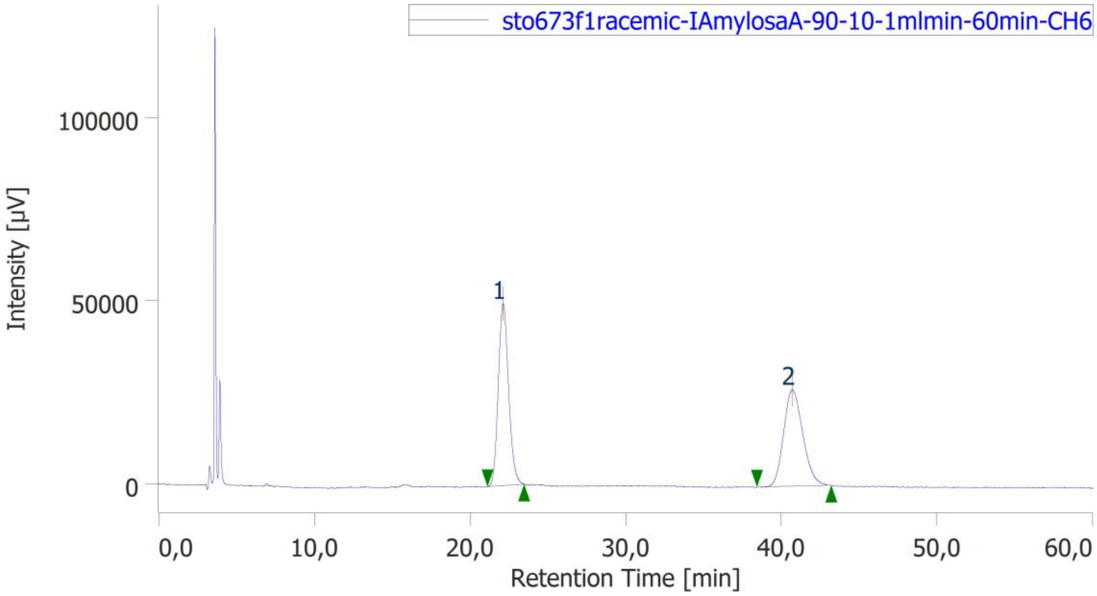
HRMS (ESI-TOF): m/z calculated for $C_{28}H_{29}NNaO_7S$ $[M+Na]^+$: 546.1562, found 546.1555.

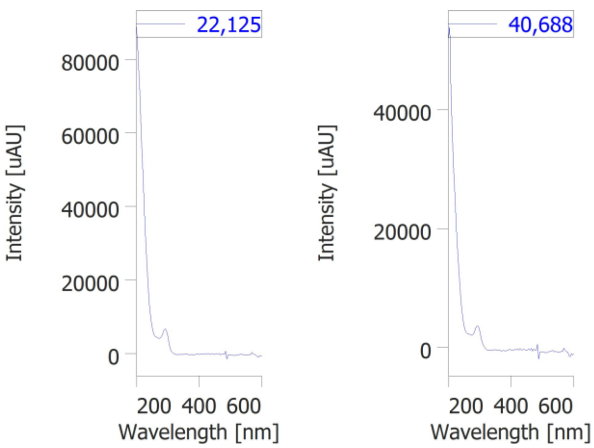




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	22,173	1649402	36087	60,170	73,934	N/A	5470	10,843	1,151	
2	Unknown	6	40,923	1091840	12723	39,830	26,066	N/A	5208	N/A	1,162	

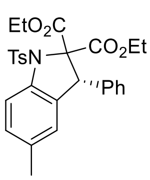




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	22,125	2266086	49575	50,180	65,322	N/A	5520	10,819	1,162	
2	Unknown	6	40,688	2249788	26319	49,820	34,678	N/A	5235	N/A	1,198	

Diethyl (*R*)-5-methyl-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3d)

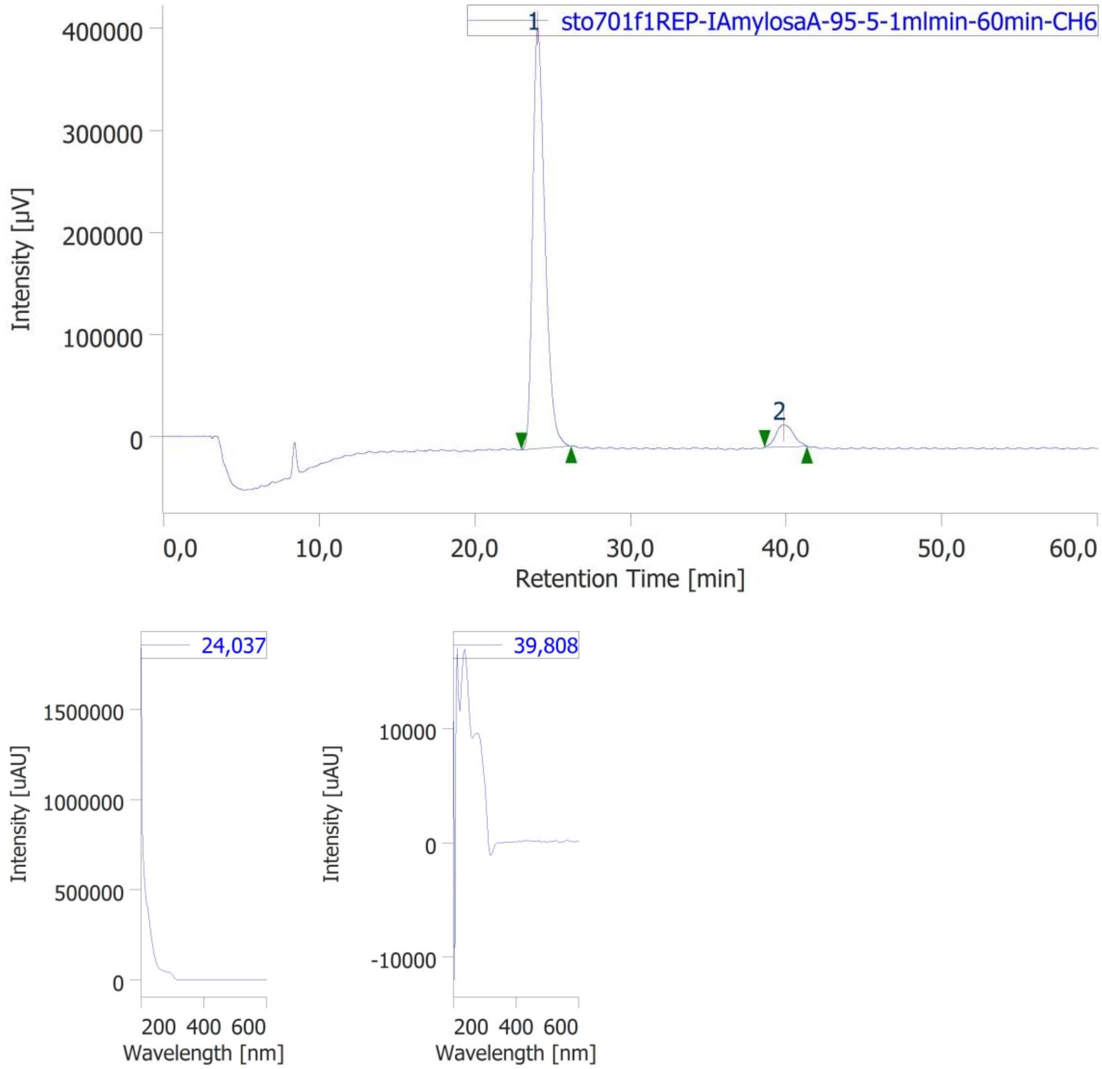


General procedure was followed to obtain **3d** as a white solid (35.1 mg, 69% yield). The enantiomeric ratio was found to be 93:7 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 95:5 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 24.037 min, tr (minor): 39.808 min. **M.p.:** 129-130 ºC. **R*f* =** 0.38 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** +3 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.10 (d, *J* = 8.2 Hz, 2H), 7.36 – 7.21 (m, 5H), 7.09 – 7.00 (m, 3H), 6.95 (d, *J* = 8.2 Hz, 1H), 6.80 (s, 1H), 5.36 (s, 1H), 4.38 (q, *J* = 7.1 Hz, 2H), 3.88 – 3.59 (m, 2H), 2.41 (s, 3H), 2.20 (s, 3H), 1.36 (t, *J* = 7.1 Hz, 3H), 0.92 (t, *J* = 7.1 Hz, 3H).

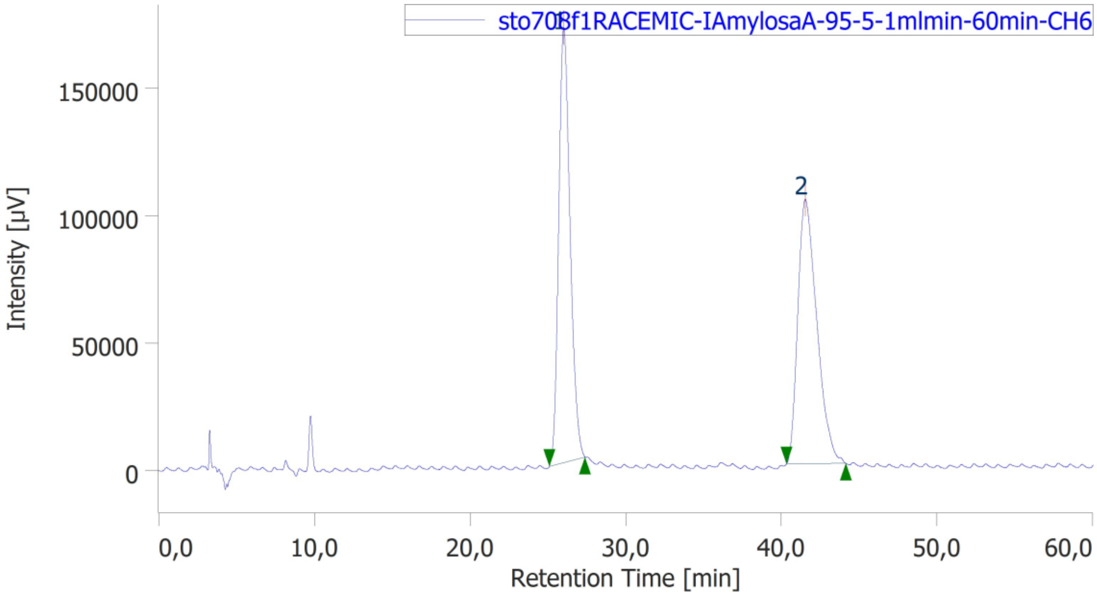
^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 168.8 (C), 165.2 (C), 143.9 (C), 139.5 (C), 138.4 (C), 138.0 (C), 133.1 (C), 129.8 (2 x CH), 129.6 (C), 129.6 (2 x CH), 129.3 (CH), 128.4 (2 x CH), 128.3 (2 x CH), 128.2 (CH), 126.4 (CH), 112.8 (CH), 82.4 (C), 63.2 (CH_2), 62.3 (CH_2), 56.2 (CH), 21.7 (CH_3), 20.9 (CH_3), 14.0 (CH_3), 13.5 (CH_3).

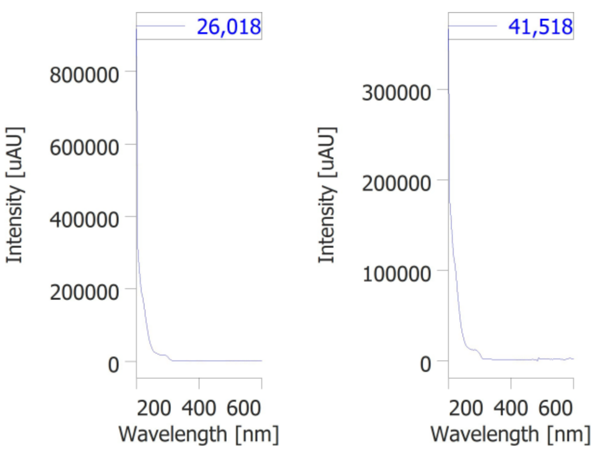
HRMS (ESI-TOF): m/z calculated for $C_{28}H_{30}NO_6S$ $[M+H]^+$: 508.1794, found 508.1786.



Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	24,037	22417845	411535	93,010	95,032	N/A	4640	9,060	1,405	
2	Unknown	6	39,808	1684716	21516	6,990	4,968	N/A	5864	N/A	1,131	

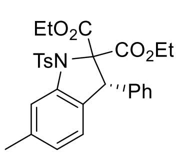




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	26,018	8679232	170611	49,680	62,177	N/A	6057	8,650	1,229	
2	Unknown	6	41,518	8791204	103783	50,320	37,823	N/A	5419	N/A	1,440	

Diethyl (*R*)-6-methyl-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3e)

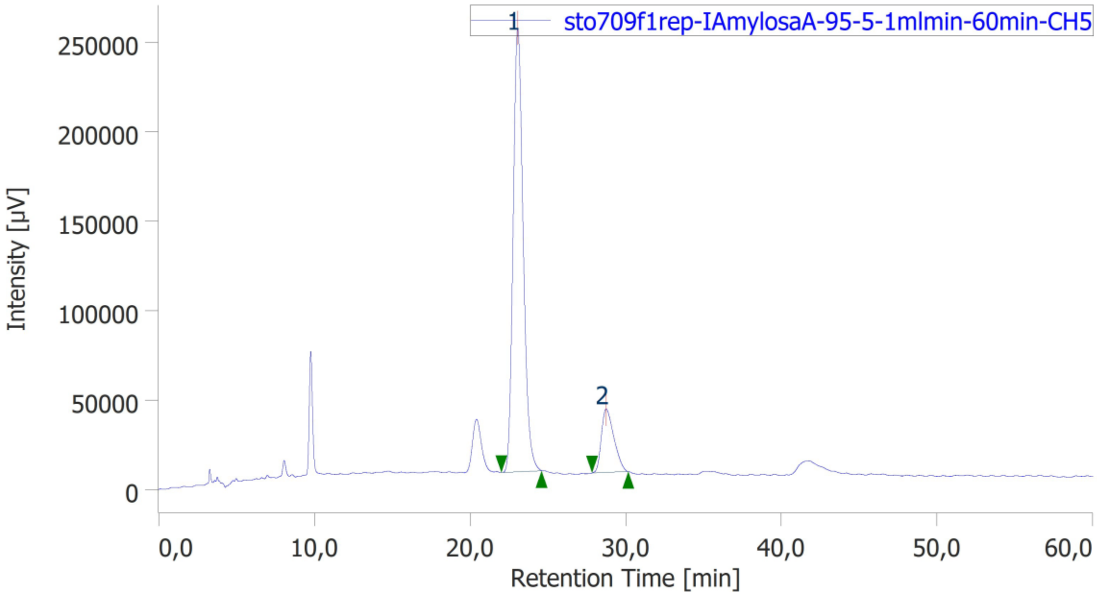


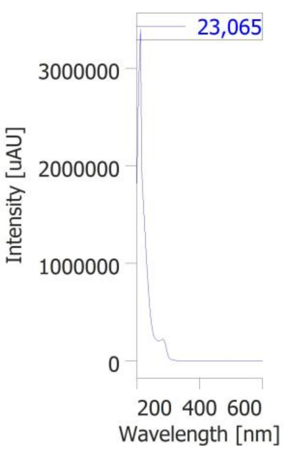
General procedure was followed to obtain **3e** as a white solid (25.4 mg, 50% yield). The enantiomeric ratio was found to be 85:15 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 95:5 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 23.065 min, tr (minor): 28.738 min. **M.p.:** 133-135 ºC. **R_f =** 0.37 (Hexane/EtOAc 8:2). $[\boldsymbol{\alpha}]_D^{25}$ **=** -45 (c = 0.1, $CHCl_3$).

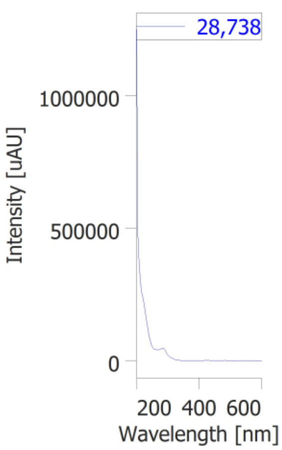
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.10 (d, *J* = 8.4 Hz, 2H), 7.35 – 7.22 (m, 5H), 7.06 – 7.01 (m, 2H), 6.98 (s, 1H), 6.87 (d, *J* = 7.5 Hz, 1H), 6.77 (d, *J* = 7.5 Hz, 1H), 5.34 (s, 1H), 4.43 – 4.33 (m, 2H), 3.84 – 3.63 (m, 2H), 2.42 (s, 3H), 2.27 (s, 3H), 1.36 (t, *J* = 7.2 Hz, 3H), 0.90 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 168.9 (C), 165.3 (C), 144.0 (C), 142.0 (C), 139.0 (C), 138.5 (C), 138.1 (C), 129.8 (2 x CH), 129.6 (2 x CH), 128.4 (2 x CH), 128.3 (2 x CH), 128.2 (CH), 126.6 (C), 125.5 (CH), 124.3 (CH), 113.8 (CH), 82.6 (C), 63.3 (CH_2), 62.4 (CH_2), 56.0 (CH), 21.9 (CH_3), 21.7 (CH_3), 14.1 (CH_3), 13.5 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{28}H_{30}NO_6S$ $[M+H]^+$: 508.1794, found 508.1787.

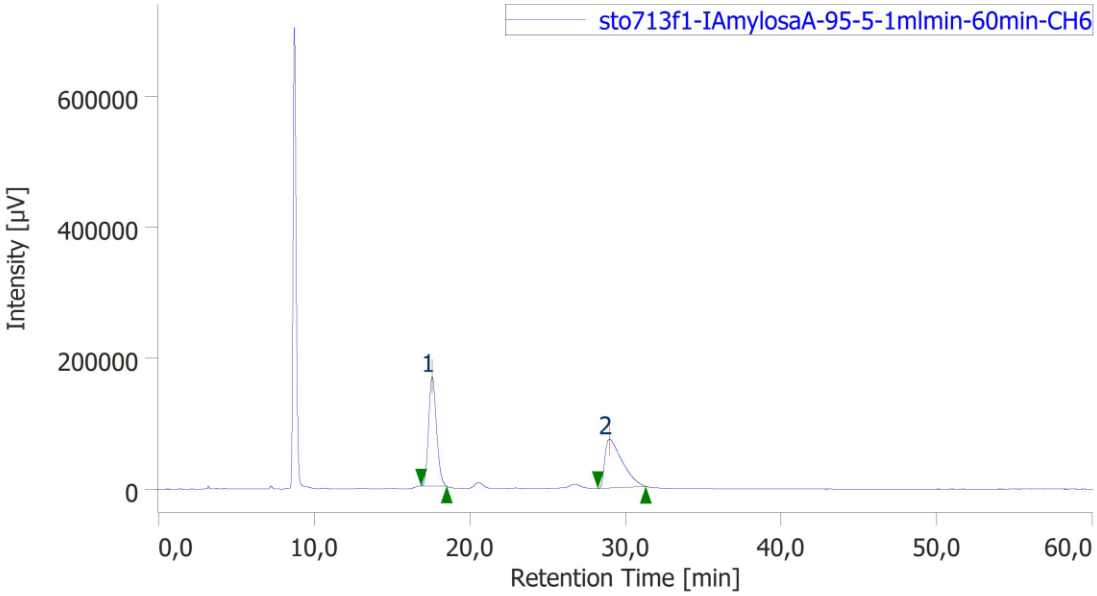


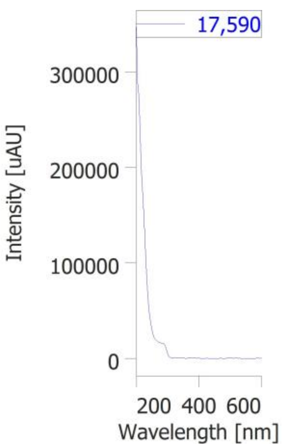


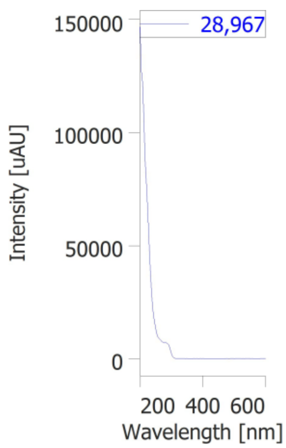


Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	5	23,065	11122094	247859	84,862	87,476	N/A	6238	4,273	1,207	
2	Unknown	5	28,738	1984024	35488	15,138	12,524	N/A	5918	N/A	1,417	



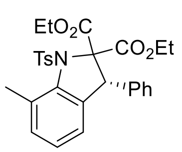




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	17,590	5868056	166972	50,454	69,178	N/A	5773	7,655	1,185	
2	Unknown	6	28,967	5762411	74394	49,546	30,822	N/A	3182	N/A	2,321	

Diethyl (*R*)-7-methyl-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3f)

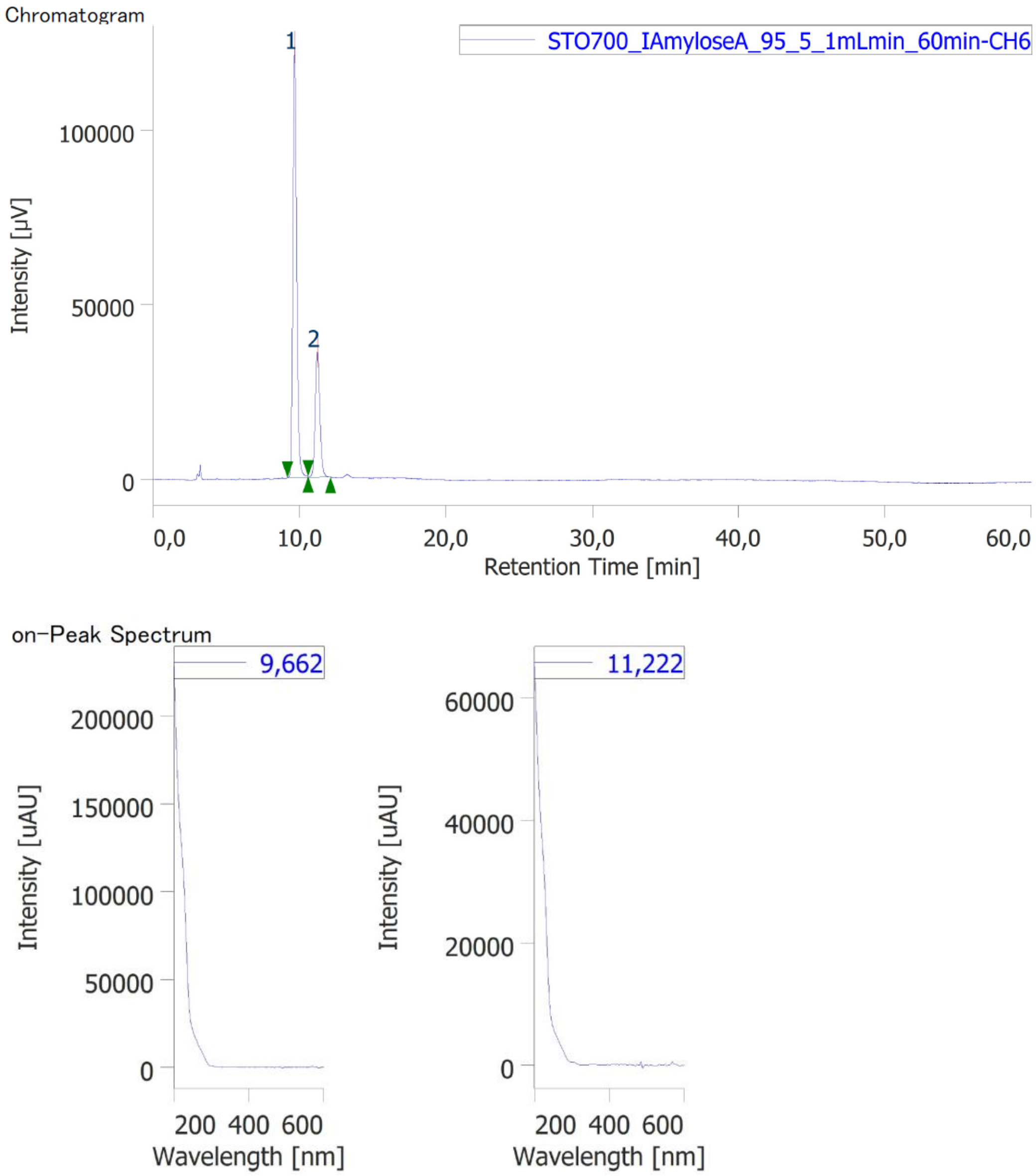


General procedure was followed to obtain **3f** as a white solid (32.5 mg, 64% yield). The enantiomeric ratio was found to be 74:26 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 95:5 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 9.662 min, tr (minor): 11.222 min. **M.p.:** 136-137 ºC. **R_f =** 0.34 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** +4 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.64 (d, *J* = 8.4 Hz, 2H), 7.25 – 7.22 (m, 3H), 7.19 (d, *J* = 8.4 Hz, 2H), 7.15 – 7.09 (m, 3H), 7.04 (t, *J* = 7.5 Hz, 1H), 6.67 (d, *J* = 7.5 Hz, 1H), 5.17 (s, 1H), 4.34 (dq, *J* = 10.7, 7.1 Hz, 1H), 4.13 (dq, *J* = 10.7, 7.1 Hz, 1H), 3.84 (dq, *J* = 10.7, 7.1 Hz, 1H), 3.41 (dq, *J* = 10.7, 7.1 Hz, 1H), 2.50 (s, 3H), 2.39 (s, 3H), 1.14 (t, *J* = 7.1 Hz, 3H), 0.73 (t, *J* = 7.1 Hz, 3H).

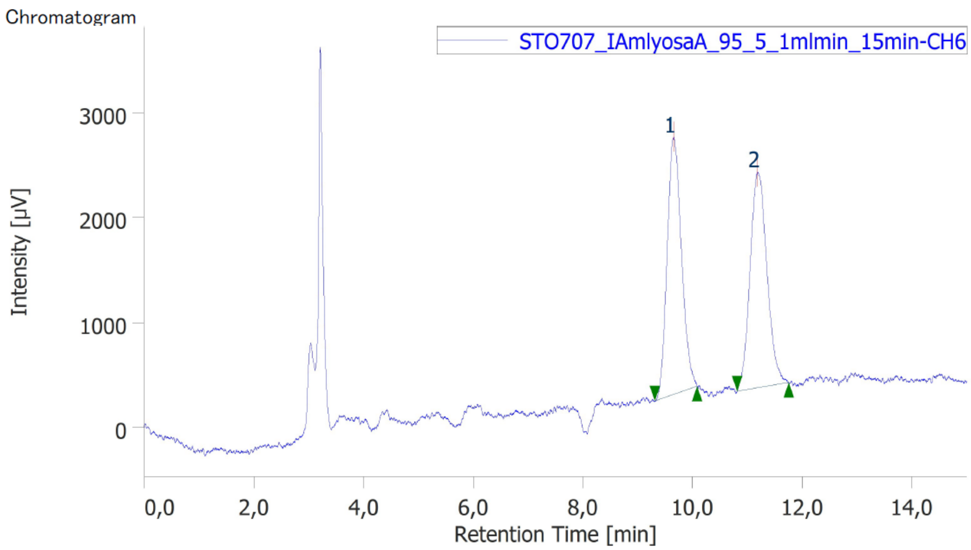
^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 166.1 (C), 165.7 (C), 143.8 (C), 143.3 (C), 137.6 (C), 137.2 (C), 136.1 (C), 131.4 (CH), 131.0 (C), 130.1 (2 x CH), 129.2 (2 x CH), 128.0 (2 x CH), 127.9 (CH), 127.8 (2 x CH), 126.5 (CH), 123.1 (CH), 84.6 (C), 62.6 (CH_2), 61.8 (CH_2), 55.5 (CH), 21.7 (CH_3), 20.0 (CH_3), 13.6 (CH_3), 13.2 (CH_3).

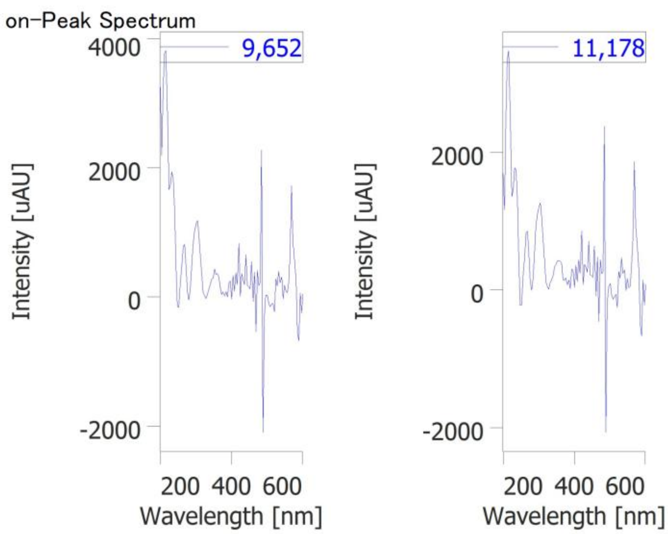
HRMS (ESI-TOF): m/z calculated for $C_{28}H_{30}NO_6S$ $[M+H]^+$: 508.1794, found 508.1787.



ıation

CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
6	9,662	2269931	123417	74,082	77,351	N/A	6680	3,020	1,190	
6	11,222	794146	36137	25,918	22,649	N/A	6353	N/A	1,119	

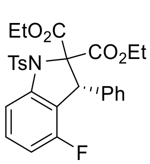




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	9,652	44325	2453	50,225	54,379	N/A	6595	2,948	1,187	
2	Unknown	6	11,178	43928	2058	49,775	45,621	N/A	6305	N/A	1,166	

Diethyl (*R*)-4-fluoro-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3g)



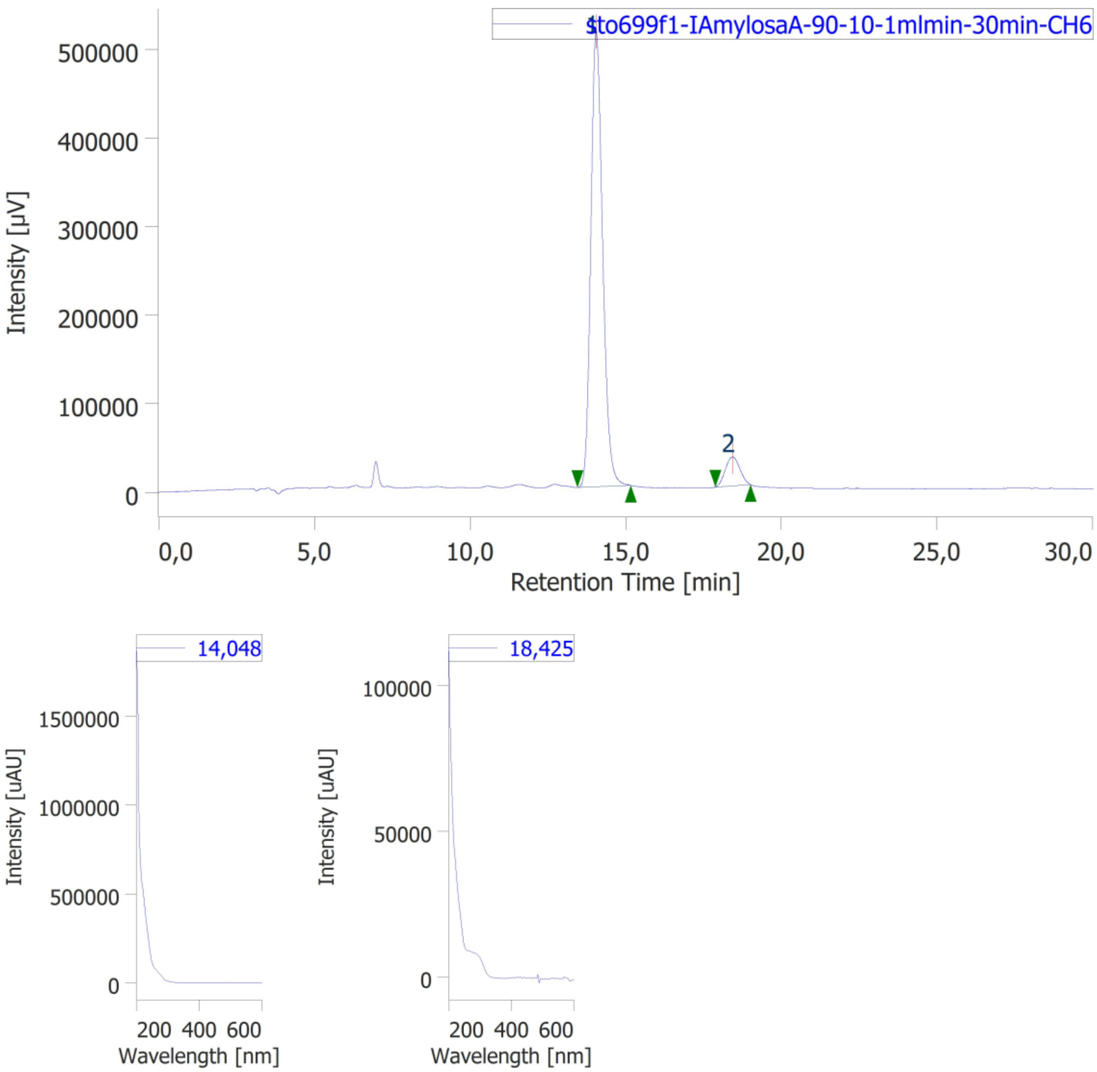
General procedure was followed to obtain **3g** as a white solid (31.7 mg, 62% yield). The enantiomeric ratio was found to be 93:7 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 14.048 min, tr (minor): 18.425 min. **M.p.:** 148-150 ºC. **R_f =** 0.35 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -9 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.11 (d, J = 8.4 Hz, 2H), 7.43 – 7.24 (m, 6H), 7.20 – 7.06 (m, 2H), 6.94 (d, J = 8.3 Hz, 1H), 6.66 (t, J = 8.3 Hz, 1H), 5.50 (s, 1H), 4.41 (q, J = 7.1 Hz, 2H), 3.88 – 3.62 (m, 2H), 2.42 (s, 3H), 1.39 (t, J = 7.1 Hz, 3H), 0.94 (t, J = 7.1 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 168.4 (C), 164.7 (C), 158.9 (d, $^1J_{C\text{-}F}$ = 249.7 Hz, C), 144.4 (C), 143.9 (d, $^3J_{C\text{-}F}$ = 7.7 Hz, C), 137.6 (C), 136.7 (C), 131.0 (d, $^3J_{C\text{-}F}$ = 8.3 Hz, CH), 129.7 (2 x CH), 129.0 (2 x CH), 128.5 (2 x CH), 128.43 (CH), 128.37 (2 x CH), 116.0 (d, $^2J_{C\text{-}F}$ = 20.7 Hz, C), 110.5 (d, $^2J_{C\text{-}F}$ = 19.8 Hz, CH), 109.0 (d, $^4J_{C\text{-}F}$ = 3.5 Hz, CH), 82.8 (C), 63.5 (CH_3), 62.6 (CH_2), 53.0 (CH), 21.7 (CH_3), 14.0 (CH_3), 13.5 (CH_3).

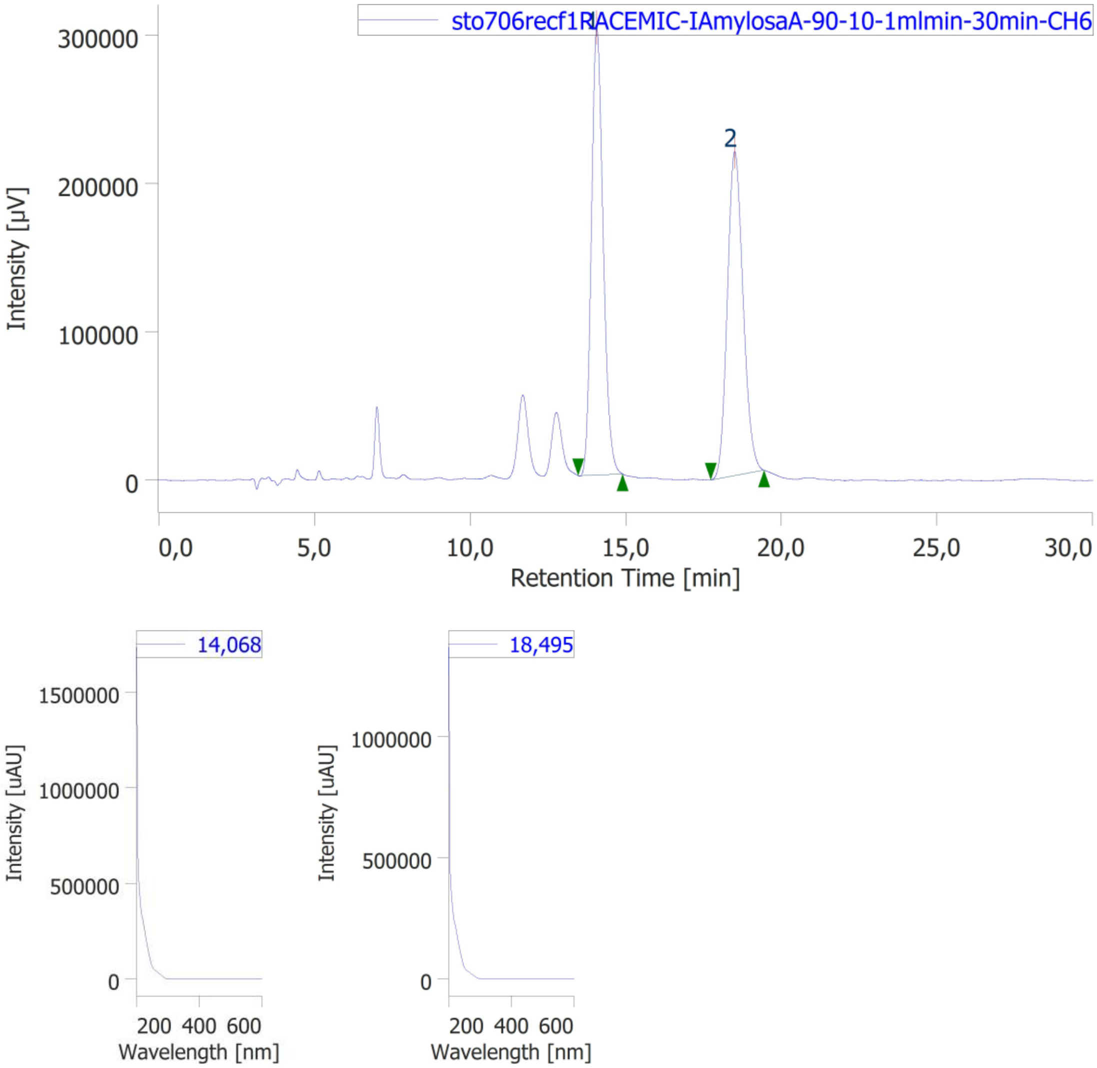
^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -115.8.

HRMS (ESI-TOF): m/z calculated for $C_{27}H_{27}FNO_6S$ $[M+H]^+$: 512.1543, found 512.1535.



Peak Information

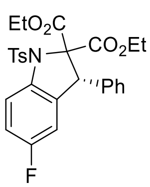
#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	14,048	13556578	513553	92,804	94,001	N/A	6700	5,602	1,206	
2	Unknown	6	18,425	1051108	32772	7,196	5,999	N/A	7008	N/A	1,050	



Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	14,068	7898632	301420	50,818	57,987	N/A	6745	5,518	1,194	
2	Unknown	6	18,495	7644399	218382	49,182	42,013	N/A	6416	N/A	1,150	

Diethyl (*R*)-5-fluoro-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3h)



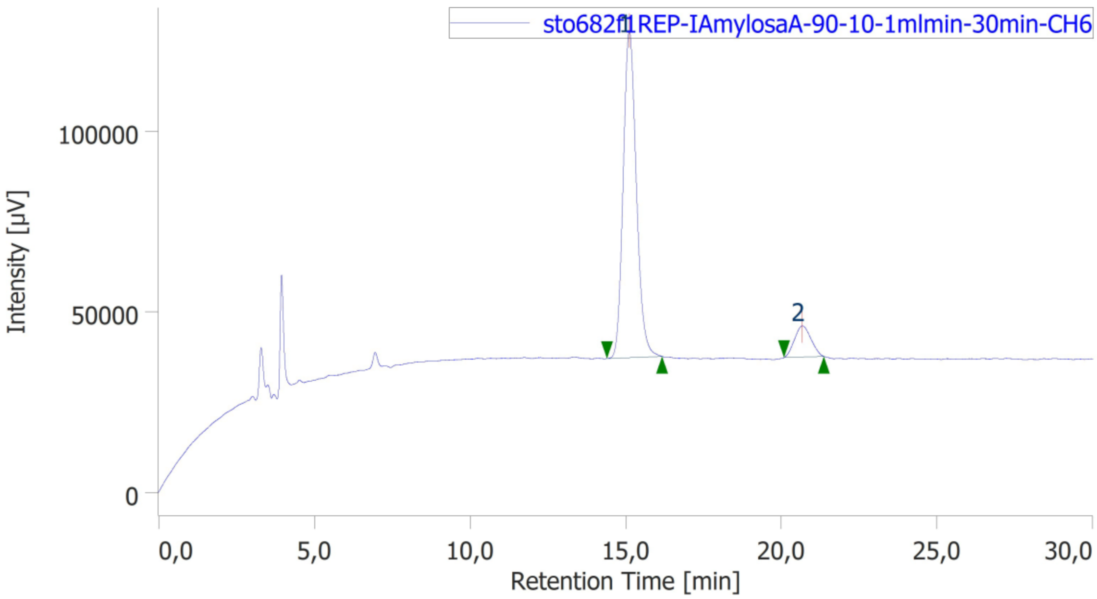
General procedure was followed to obtain **3h** as a white solid (28.7 mg, 56% yield). The enantiomeric ratio was found to be 89:11 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 15.113 min, tr (minor): 20.657 min. **M.p.:** 143-144 ºC. **R$_f$ =** 0.37 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** +4 (c = 0.1, $CHCl_3$).

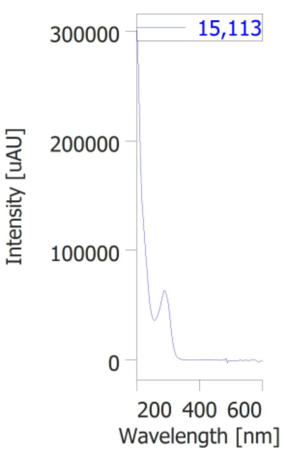
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.09 (d, *J* = 8.4 Hz, 2H), 7.33 – 7.26 (m, 5H), 7.08 (dd, *J* = 8.8, 4.3 Hz, 1H), 7.04 – 7.00 (m, 2H), 6.85 (td, *J* = 8.8, 2.7 Hz, 1H), 6.71 (dd, *J* = 7.9, 1.7 Hz, 1H), 5.36 (s, 1H), 4.39 (q, *J* = 7.2 Hz, 2H), 3.87 – 3.61 (m, 2H), 2.43 (s, 3H), 1.37 (t, *J* = 7.2 Hz, 3H), 0.93 (t, *J* = 7.2 Hz, 3H).

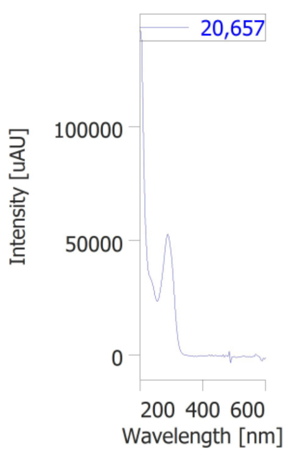
^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 168.6 (C), 165.0 (C), 159.4 (d, $^1J_{C\text{-}F}$ = 242.1 Hz, C), 144.3 (C), 137.9 (d, $^4J_{C\text{-}F}$ = 2.1 Hz, C), 137.7 (C), 137.5 (C), 131.4 (d, $^3J_{C\text{-}F}$ = 8.3 Hz, C), 129.8 (2 x CH), 129.7 (2 x CH), 128.5 (CH), 128.4 (2 x CH), 128.4 (2 x CH), 115.5 (d, $^2J_{C\text{-}F}$ = 23.6 Hz, CH), 113.8 (d, $^3J_{C\text{-}F}$ = 8.3 Hz, CH), 113.1 (d, $^2J_{C\text{-}F}$ = 24.7 Hz, CH), 82.7 (C), 63.4 (CH$_2$), 62.5 (CH$_2$), 56.0 (d, $^4J_{C\text{-}F}$ = 1.8 Hz, CH), 21.7 (CH$_3$), 14.0 (CH$_3$), 13.5 (CH$_3$).

^{19}F NMR (376 MHz, CDCl$_3$) δ (ppm) -120.1.

HRMS (ESI-TOF): m/z calculated for $C_{27}H_{27}FNO_6S$ [M+H]$^+$: 512.1543, found 512.1536.

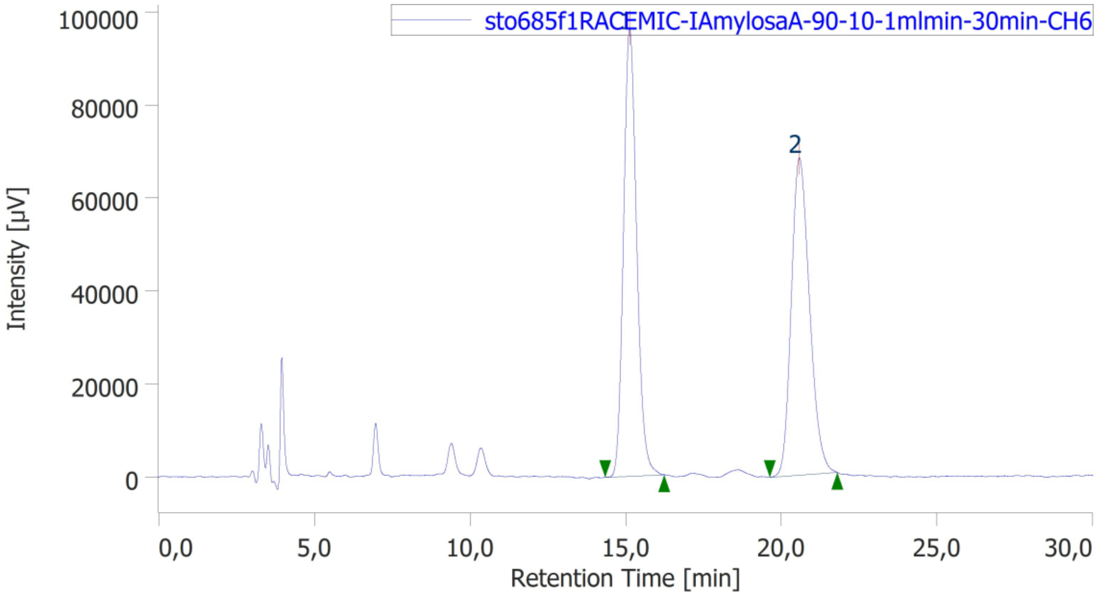


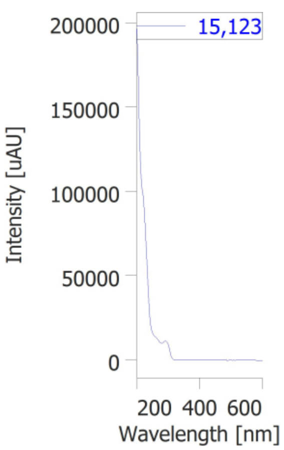


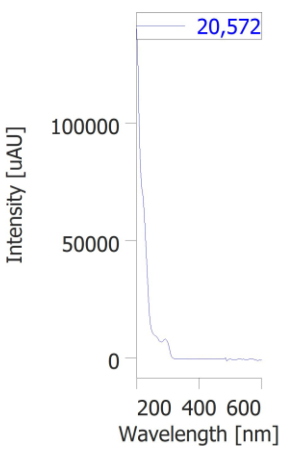


Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	15,113	2645990	90430	89,366	91,289	N/A	6320	6,298	1,168	
2	Unknown	6	20,657	314854	8629	10,634	8,711	N/A	6765	N/A	1,098	



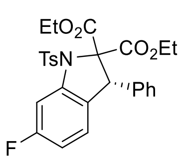




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	15,123	2817839	96404	50,390	58,567	N/A	6359	5,982	1,169	
2	Unknown	6	20,572	2774211	68200	49,610	41,433	N/A	5937	N/A	1,220	

Diethyl (*R*)-6-fluoro-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3i)



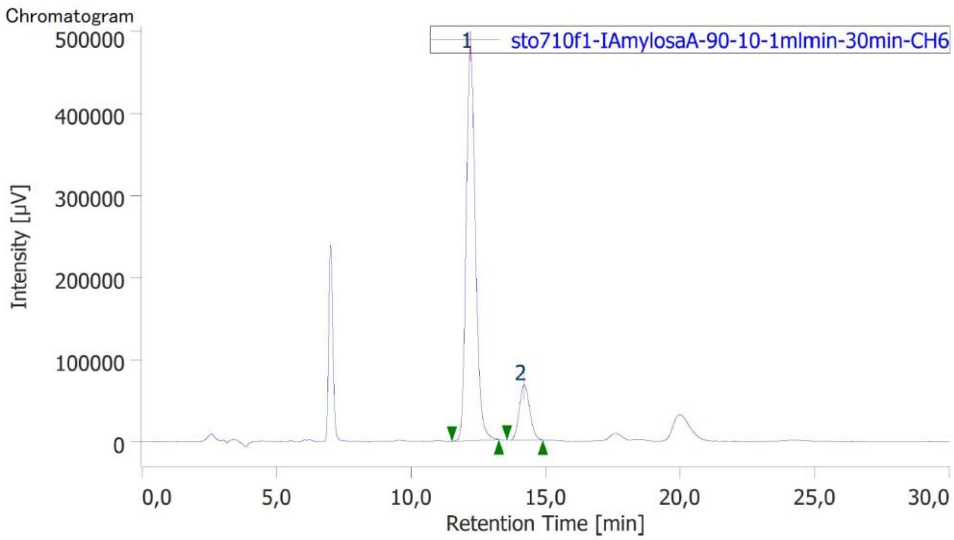
General procedure was followed to obtain **3i** as a white solid (28.7 mg, 56% yield). The enantiomeric ratio was found to be 90:10 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 86:14 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 12.207 min, tr (minor): 14.203 min. **M.p.:** 144-145 ºC. **R*f* =** 0.37 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -7 (c = 0.1, $CHCl_3$).

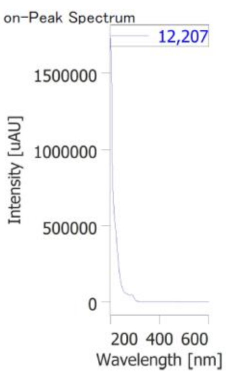
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.10 (d, *J* = 8.4 Hz, 2H), 7.32 (d, *J* = 8.4 Hz, 2H), 7.30 – 7.27 (m, 3H), 7.09 – 6.96 (m, 2H), 6.93 – 6.85 (m, 2H), 6.65 (td, *J* = 8.6, 2.4 Hz, 1H), 5.33 (s, 1H), 4.40 (q, *J* = 7.1 Hz, 2H), 3.84 – 3.66 (m, 2H), 2.43 (s, 3H), 1.38 (t, *J* = 7.1 Hz, 3H), 0.93 (t, *J* = 7.1 Hz, 3H).

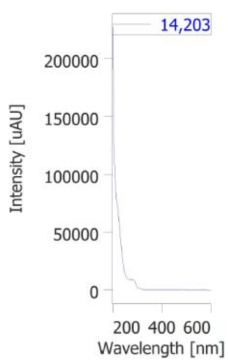
^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 168.6 (C), 164.9 (C), 163.2 (d, $^{1}J_{C\text{-}F}$ = 245.0 Hz, C), 144.5 (C), 143.2 (d, $^{3}J_{C\text{-}F}$ = 11.6 Hz, C), 138.0 (C), 137.5 (C), 129.8 (2 x CH), 129.8 (2 x CH), 128.5 (2 x CH), 128.4 (CH), 128.4 (2 x CH), 126.7 (d, $^{3}J_{C\text{-}F}$ = 10.0 Hz, CH), 125.0 (d, $^{4}J_{C\text{-}F}$ = 2.8 Hz, C), 110.2 (d, $^{2}J_{C\text{-}F}$ = 22.9 Hz, CH), 101.6 (d, $^{2}J_{C\text{-}F}$ = 29.2 Hz, CH), 83.1 (C), 63.4 (CH$_2$), 62.5 (CH$_2$), 55.7 (CH), 21.8 (CH$_3$), 14.1 (CH$_3$), 13.6 (CH$_3$).

^{19}F NMR (376 MHz, CDCl$_3$) δ (ppm) -111.9.

HRMS (ESI-TOF): m/z calculated for $C_{27}H_{27}FNO_6S$ [M+H]$^+$: 512.1543, found 512.1537.

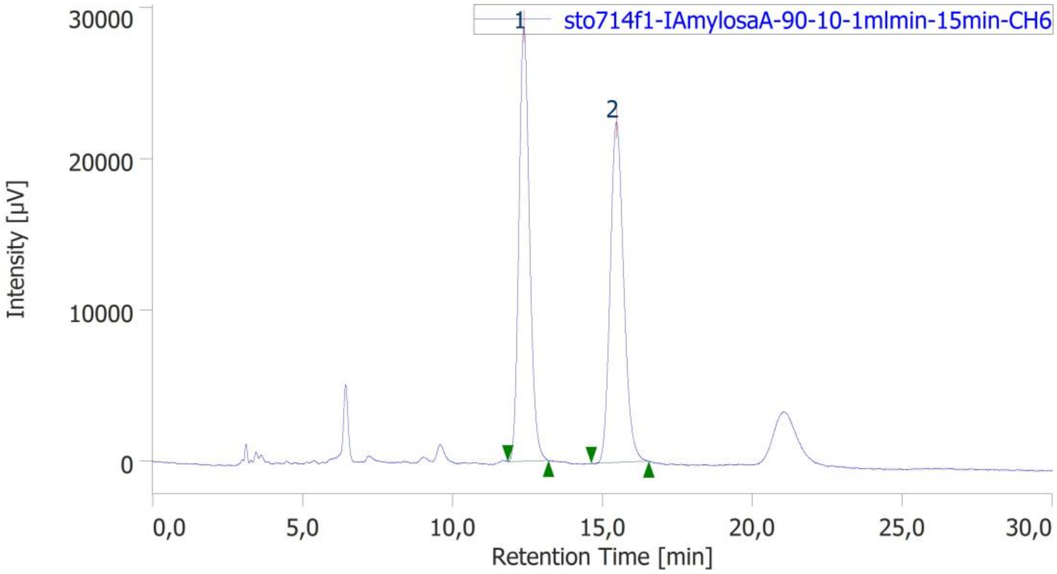


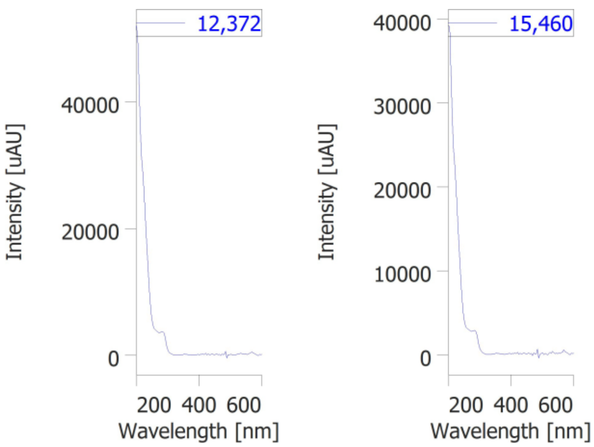




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	12,207	11431373	479728	86,278	87,650	N/A	6321	3,017	1,194	
2	Unknown	6	14,203	1818100	67593	13,722	12,350	N/A	6349	N/A	1,122	

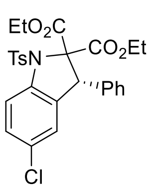




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	12,372	707910	28702	50,103	56,065	N/A	5921	4,244	1,187	
2	Unknown	6	15,460	704991	22492	49,897	43,935	N/A	5739	N/A	1,179	

Diethyl (*R*)-5-chloro-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3j)

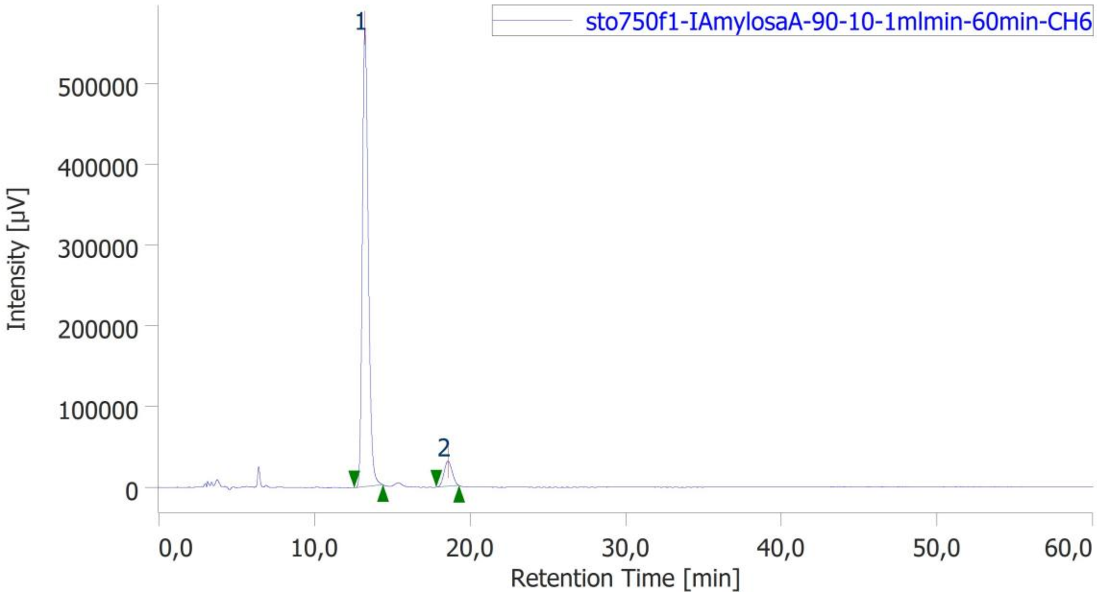


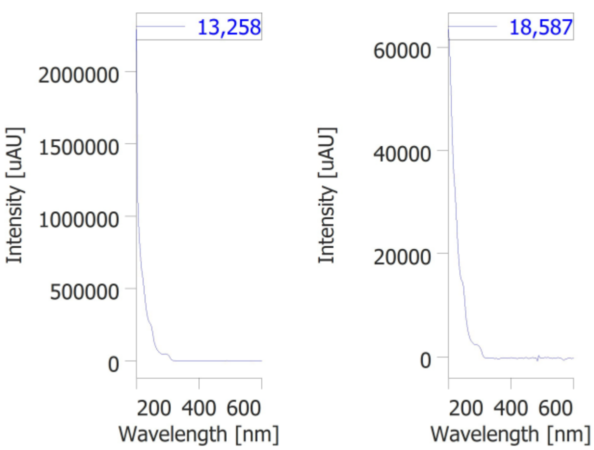
General procedure was followed to obtain **3j** as a white solid (32.7 mg, 62% yield). The enantiomeric ratio was found to be 93:7 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 13.258 min, tr (minor): 18.587 min. **M.p.:** 140-142 ºC. **R_f =** 0.36 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** +71 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.09 (d, *J* = 8.4 Hz, 2H), 7.34 – 7.27 (m, 5H), 7.12 (dd, *J* = 8.7, 2.1 Hz, 1H), 7.07 (d, *J* = 8.7 Hz, 1H), 7.05 – 7.00 (m, 2H), 6.97 (s, 1H), 5.35 (s, 1H), 4.39 (q, *J* = 7.1 Hz, 2H), 3.88 – 3.66 (m, 2H), 2.43 (s, 3H), 1.37 (t, *J* = 7.1 Hz, 3H), 0.93 (t, *J* = 7.1 Hz, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 168.4 (C), 164.7 (C), 144.3 (C), 140.4 (C), 137.4 (C), 137.3 (C), 131.4 (C), 129.7 (2 x CH), 129.6 (2 x CH), 128.7 (CH), 128.5 (C), 128.4 (CH), 128.3 (4 x CH), 125.8 (CH), 113.9 (CH), 82.4 (C), 63.3 (CH$_2$), 62.4 (CH$_2$), 55.8 (CH), 21.6 (CH$_3$), 13.9 (CH$_3$), 13.4 (CH$_3$).

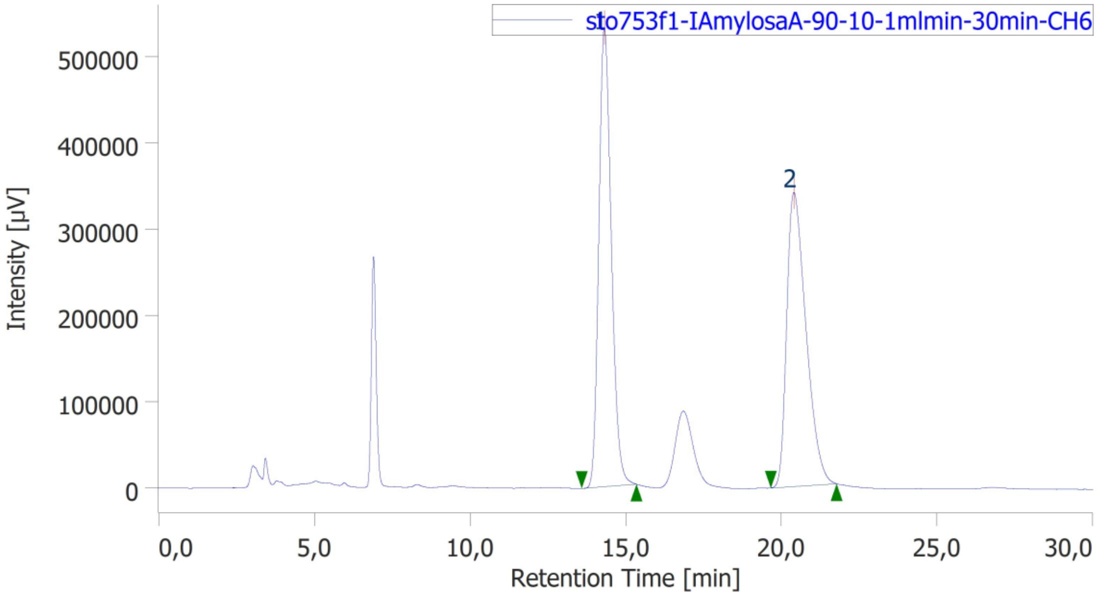
HRMS (ESI-TOF): m/z calculated for $C_{27}H_{27}ClNO_6S$ $[M+H]^+$: 528.1248, found 528.1239.

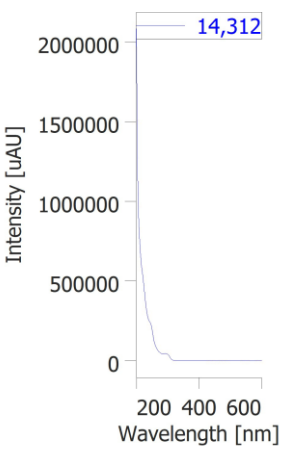


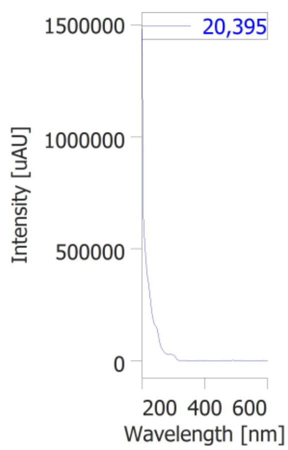


Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	13,258	15148463	567240	93,070	94,769	N/A	5847	6,415	1,257	
2	Unknown	6	18,587	1127928	31313	6,930	5,231	N/A	5850	N/A	1,058	



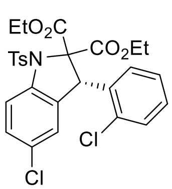




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	14,312	14793845	531820	50,284	60,943	N/A	6209	6,566	1,227	
2	Unknown	6	20,395	14626893	340826	49,716	39,057	N/A	5200	N/A	1,519	

Diethyl (*S*)-5-chloro-3-(2-chlorophenyl)-1-tosylindoline-2,2-dicarboxylate (3k)

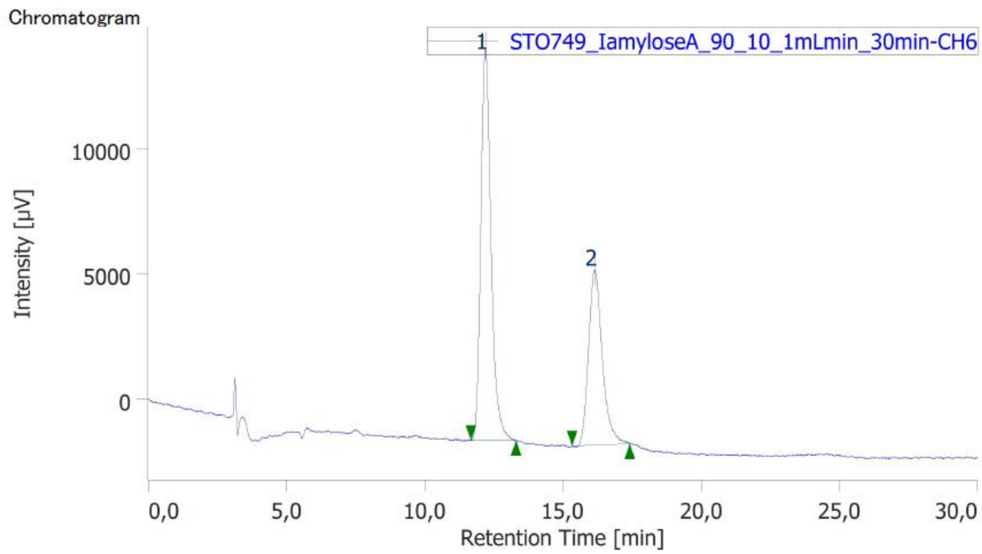


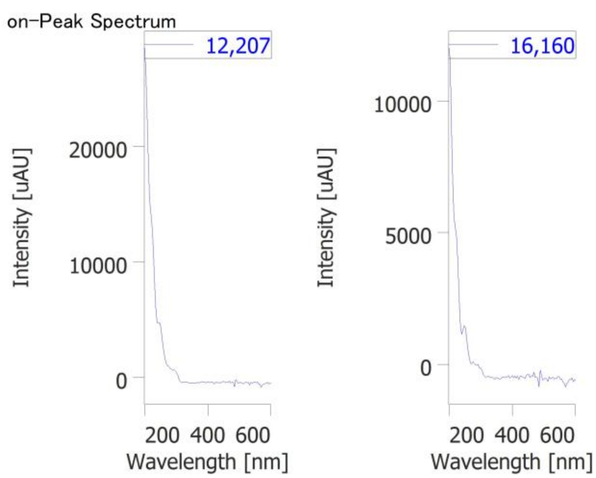
General procedure was followed to obtain **3k** as a white solid (34.3 mg, 61% yield). The enantiomeric ratio was found to be 62:38 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 12.207 min, tr (minor): 16.160 min. **M.p.:** 154-156 ºC. **R*f* =** 0.40 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -9 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.04 (d, *J* = 8.4 Hz, 2H), 7.41 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.28 (d, *J* = 8.4 Hz, 2H), 7.24 (td, *J* = 8.0, 1.7 Hz, 1H), 7.18 – 7.11 (m, 2H), 7.08 (td, *J* = 8.0, 1.7 Hz, 1H), 6.93 (s, 1H), 6.46 (dd, *J* = 7.9, 1.6 Hz, 1H), 5.93 (s, 1H), 4.43 – 4.33 (m, 1H), 4.22 (dq, *J* = 7.1, 4.3 Hz, 1H), 4.01 (dq, *J* = 10.8, 7.1 Hz, 1H), 3.83 (dq, *J* = 10.8, 7.1 Hz, 1H), 2.42 (s, 3H), 1.36 (t, *J* = 7.1 Hz, 3H), 1.06 (t, *J* = 7.1 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 168.2 (C), 164.8 (C), 144.5 (C), 140.3 (C), 137.1 (C), 135.8 (C), 135.1 (C), 131.7 (C), 131.3 (CH), 129.7 (2 x CH), 129.6 (CH), 129.5 (CH), 129.1 (CH), 128.8 (C), 128.6 (2 x CH), 126.7 (CH), 126.0 (CH), 114.0 (CH), 82.0 (C), 63.5 (CH_2), 62.8 (CH_2), 52.0 (CH), 21.7 (CH_3), 14.0 (CH_3), 13.6 (CH_3).

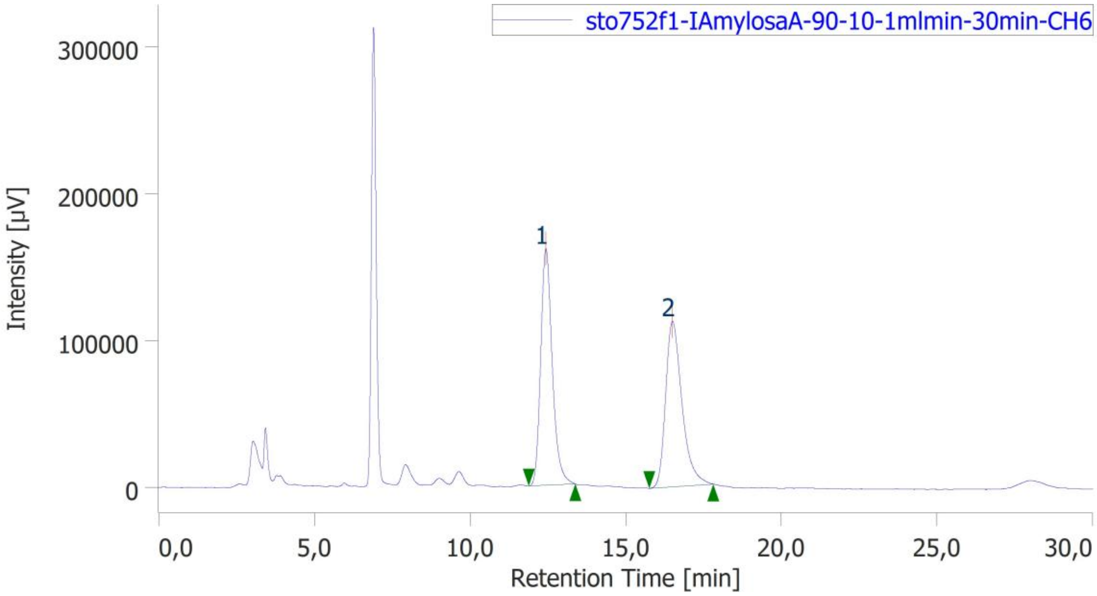
HRMS (ESI-TOF): m/z calculated for $C_{27}H_{26}Cl_2NO_6S$ $[M+H]^+$: 562.0858, found 562.0857.

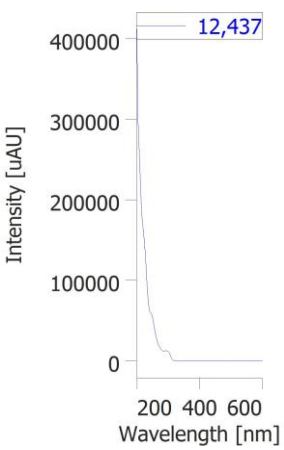


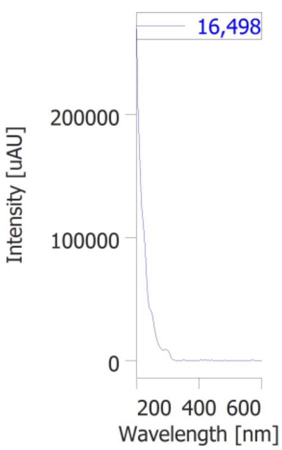


Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	12,207	401134	15690	62,333	69,211	N/A	5720	5,199	1,276	
2	Unknown	6	16,160	242398	6980	37,667	30,789	N/A	5403	N/A	1,300	



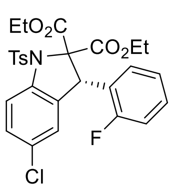




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	12,437	4155402	161099	50,281	58,857	N/A	5729	5,154	1,263	
2	Unknown	6	16,498	4108951	112613	49,719	41,143	N/A	5110	N/A	1,408	

Diethyl (*S*)-5-chloro-3-(2-fluorophenyl)-1-tosylindoline-2,2-dicarboxylate (3l)



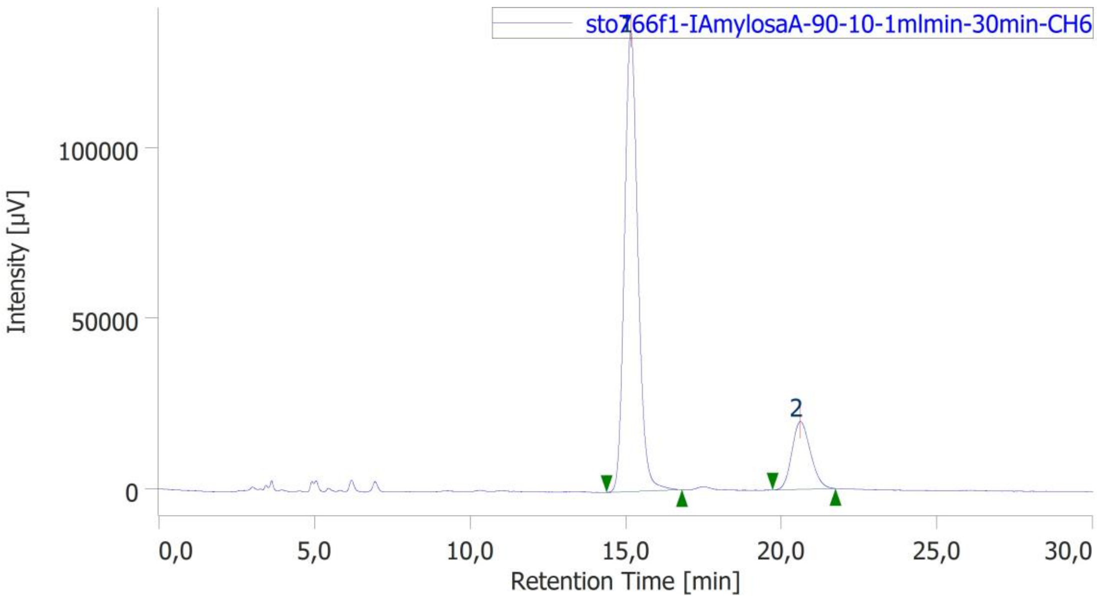
General procedure was followed to obtain **3l** as a white solid (33.3 mg, 61% yield). The enantiomeric ratio was found to be 83:17 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 15.157 min, tr (minor): 20.597 min. **M.p.:** 156-157 ºC. **R_f =** 0.41 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -3 (c = 0.1, $CHCl_3$).

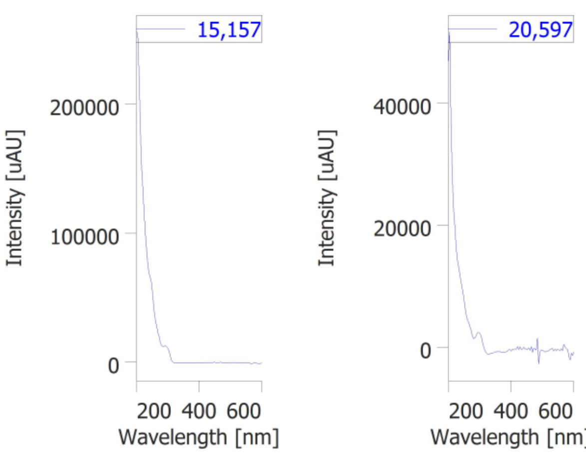
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.06 (d, *J* = 8.5 Hz, 2H), 7.36 – 7.27 (m, 3H), 7.18 – 7.10 (m, 2H), 7.07 (t, *J* = 9.5 Hz, 1H), 7.02 (t, *J* = 7.7 Hz, 1H), 6.94 (d, *J* = 1.4 Hz, 1H), 6.61 (s, 1H), 5.71 (s, 1H), 4.48 – 4.29 (m, 2H), 3.95 (dq, *J* = 10.7, 7.1 Hz, 1H), 3.84 (dq, *J* = 10.7, 7.1 Hz, 1H), 2.42 (s, 3H), 1.36 (t, *J* = 7.1 Hz, 3H), 1.03 (t, *J* = 7.1 Hz, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 168.1 (C), 164.9 (C), 161.3 (d, $^{1}J_{C-F}$ = 246.0 Hz, C), 144.5 (C), 140.5 (C), 137.2 (C), 130.8 (CH), 130.4 (C), 130.3 (C), 129.7 (2 x CH), 129.0 (CH), 128.7 (CH), 128.5 (2 x CH), 125.7 (C), 124.7 (d, $^{2}J_{C-F}$ = 13.9 Hz, CH), 124.2 (CH), 124.1 (CH), 113.9 (CH), 82.0 (C), 63.5 (CH$_2$), 62.7 (CH$_2$), 48.4 (CH), 21.7 (CH$_3$), 14.0 (CH$_3$), 13.6 (CH$_3$).

^{19}F NMR (376 MHz, CDCl$_3$) δ (ppm) -116.3.

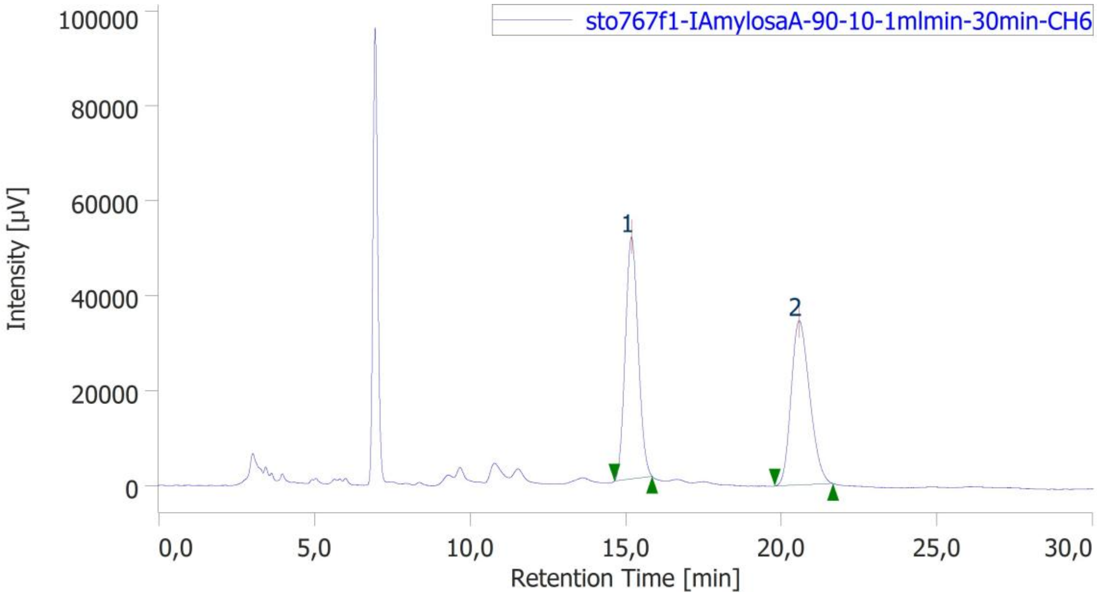
HRMS (ESI-TOF): m/z calculated for $C_{27}H_{26}ClFNO_6S$ $[M+H]^+$: 546.1153, found 546.1143.

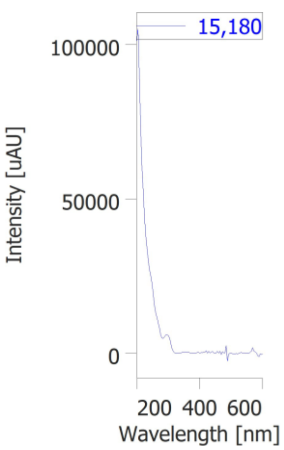


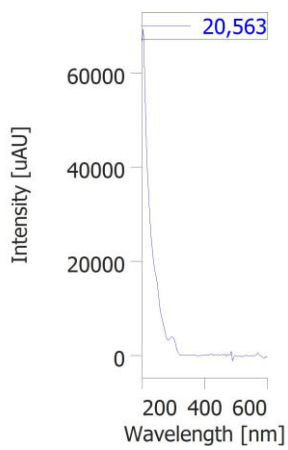


Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	15,157	4032214	134880	83,041	87,165	N/A	6181	5,845	1,162	
2	Unknown	6	20,597	823475	19862	16,959	12,835	N/A	5660	N/A	1,181	



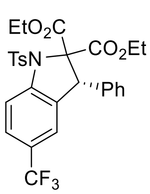




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	15,180	1455429	50906	50,364	59,531	N/A	6373	5,801	1,106	
2	Unknown	6	20,563	1434394	34606	49,636	40,469	N/A	5590	N/A	1,241	

Diethyl (*R*)-3-phenyl-1-tosyl-5-(trifluoromethyl)indoline-2,2-dicarboxylate (3m)



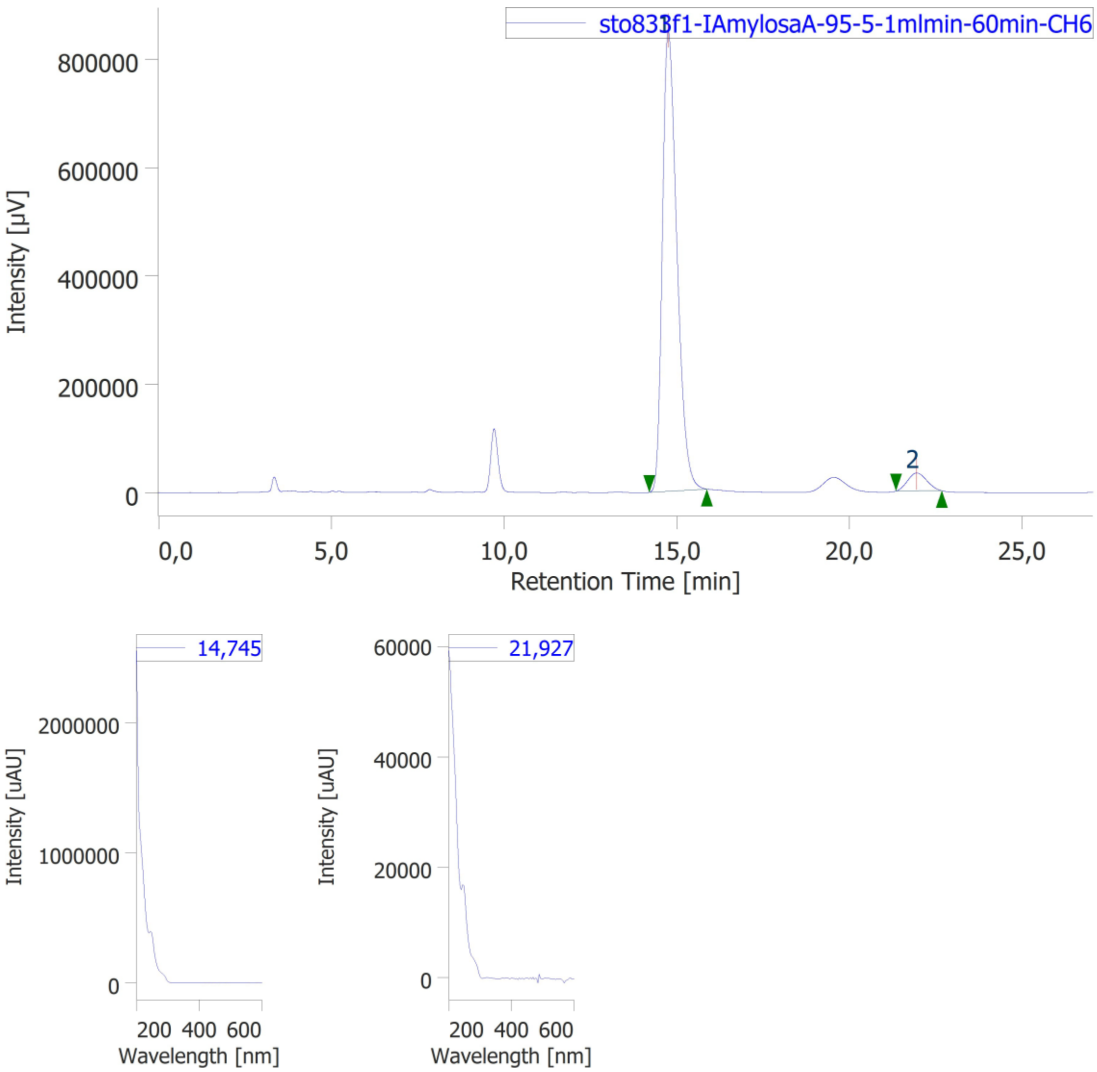
General procedure was followed to obtain **3m** as a white solid (33.7 mg, 60% yield). The enantiomeric ratio was found to be 95:5 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 95:5 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 14.745 min, tr (minor): 21.927 min. **M.p.:** 148-149 ºC. **R*f* =** 0.40 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** +78 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.12 (d, *J* = 8.4 Hz, 2H), 7.44 (d, *J* = 8.5 Hz, 1H), 7.37 – 7.27 (m, 5H), 7.25 – 7.20 (m, 2H), 7.10 – 6.97 (m, 2H), 5.41 (s, 1H), 4.40 (q, *J* = 7.1 Hz, 2H), 3.77 (q, *J* = 7.1 Hz, 2H), 2.43 (s, 3H), 1.38 (t, *J* = 7.1 Hz, 3H), 0.95 (t, *J* = 7.1 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 168.4 (C), 164.8 (C), 144.8 (C), 144.7 (C), 137.3 (C), 137.2 (C), 130.4 (C), 129.8 (2 x CH), 129.8 (2 x CH), 128.7 (CH), 128.5 (2 x CH), 128.5 (2 x CH), 126.5 (q, $^{4}J_{C\text{-}F}$ = 3.7 Hz, CH), 125.7 (q, $^{2}J_{C\text{-}F}$ = 32.9 Hz, C), 123.7 (q, $^{1}J_{C\text{-}F}$ = 271.0 Hz, C), 123.1 (q, $^{4}J_{C\text{-}F}$ = 3.7 Hz, CH), 112.9 (CH), 82.6 (C), 63.5 (CH_2), 62.6 (CH_2), 56.0 (CH), 21.8 (CH_3), 14.0 (CH_3), 13.6 (CH_3).

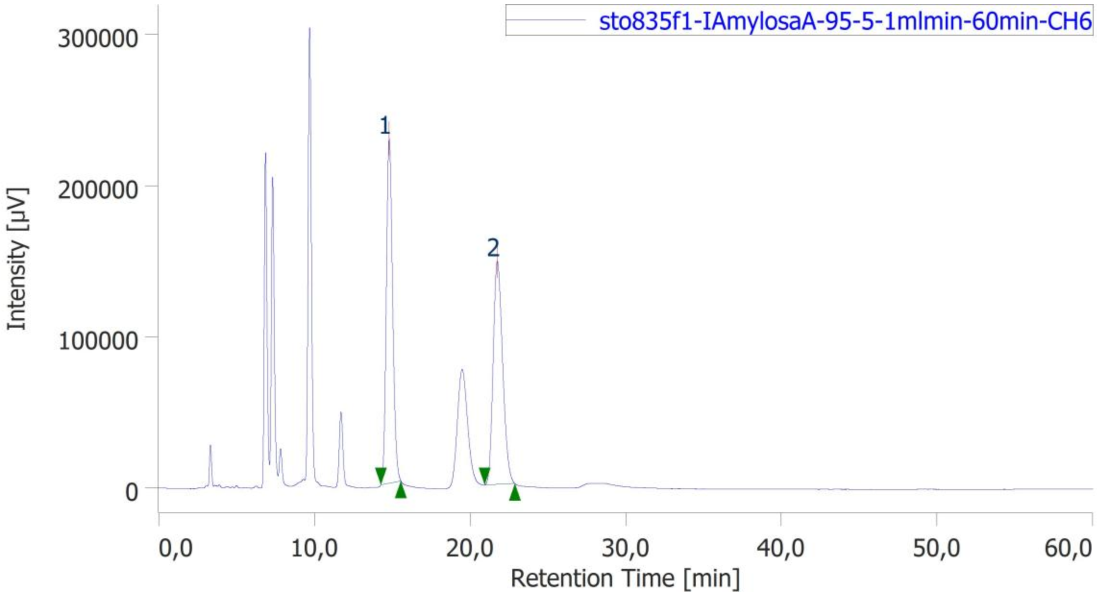
^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -61.7.

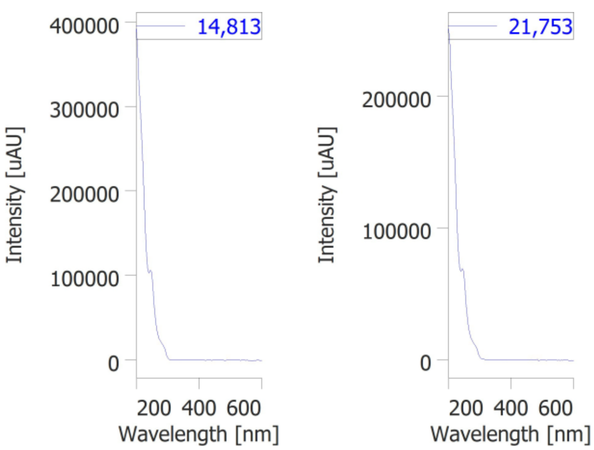
HRMS (ESI-TOF): m/z calculated for $C_{28}H_{27}F_3NO_6S$ $[M+H]^+$: 562.1511, found 562.1503.



Peak Information

#	Peak Name	CH	tR [min]	Area [μV·sec]	Height [μV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	14,745	24737708	850145	95,103	96,251	N/A	6004	7,929	1,389	
2	Unknown	6	21,927	1273681	33117	4,897	3,749	N/A	6908	N/A	1,110	

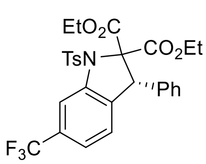




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	14,813	6349617	227728	50,493	60,691	N/A	6498	7,513	1,179	
2	Unknown	6	21,753	6225562	147497	49,507	39,309	N/A	6065	N/A	1,230	

Diethyl (*R*)-3-phenyl-1-tosyl-6-(trifluoromethyl)indoline-2,2-dicarboxylate (3n)



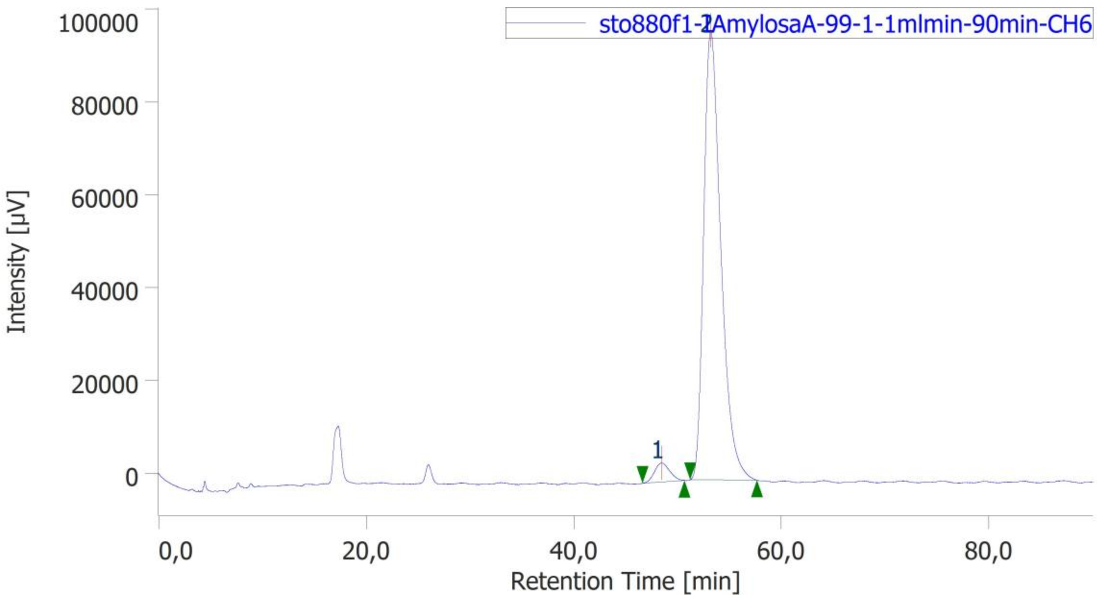
General procedure was followed to obtain **3n** as a white solid (35.4 mg, 63% yield). The enantiomeric ratio was found to be 4:96 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 99:1 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (minor): 48.452 min; tr (major): 53.177 min,. **M.p.:** 150-151 ºC. $\mathbf{R_f}$ **=** 0.40 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -120 (c = 0.1, $CHCl_3$).

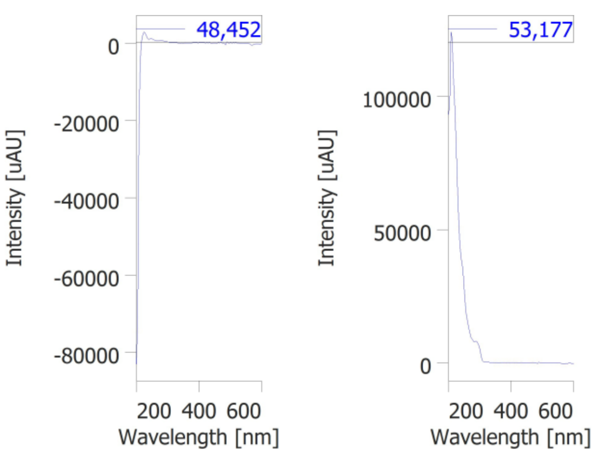
^{1}**H NMR (400 MHz, CDCl$_3$)** δ (ppm) 8.11 (d, *J* = 8.1 Hz, 2H), 7.42 (s, 1H), 7.33 (d, *J* = 8.1 Hz, 2H), 7.31 – 7.26 (m, 3H), 7.23 (d, *J* = 7.9 Hz, 1H), 7.08 (d, *J* = 7.9 Hz, 1H), 7.05 – 6.99 (m, 2H), 5.41 (s, 1H), 4.40 (dq, *J* = 7.1, 1.2 Hz, 2H), 3.77 (q, *J* = 7.1 Hz, 2H), 2.43 (s, 3H), 1.38 (t, *J* = 7.1 Hz, 3H), 0.95 (t, *J* = 7.1 Hz, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 168.4 (C), 164.8 (C), 144.7 (C), 142.4 (C), 137.2 (C), 137.1 (C), 133.6 (C), 131.3 (q, $^{2}J_{C\text{-}F}$ = 32.3 Hz, C), 129.9 (2 x CH), 129.8 (2 x CH), 128.6 (CH), 128.6 (2 x CH), 128.5 (2 x CH), 126.2 (CH), 123.9 (q, $^{1}J_{C\text{-}F}$ = 272.6 Hz, C), 120.5 (q, $^{4}J_{C\text{-}F}$ = 3.7 Hz, CH), 109.9 (q, $^{4}J_{C\text{-}F}$ = 3.9 Hz, CH), 82.5 (C), 63.5 (CH$_2$), 62.6 (CH$_2$), 56.1 (CH), 21.7 (CH$_3$), 14.0 (CH$_3$), 13.6 (CH$_3$).

^{19}F NMR (376 MHz, CDCl$_3$) δ (ppm) -62.4.

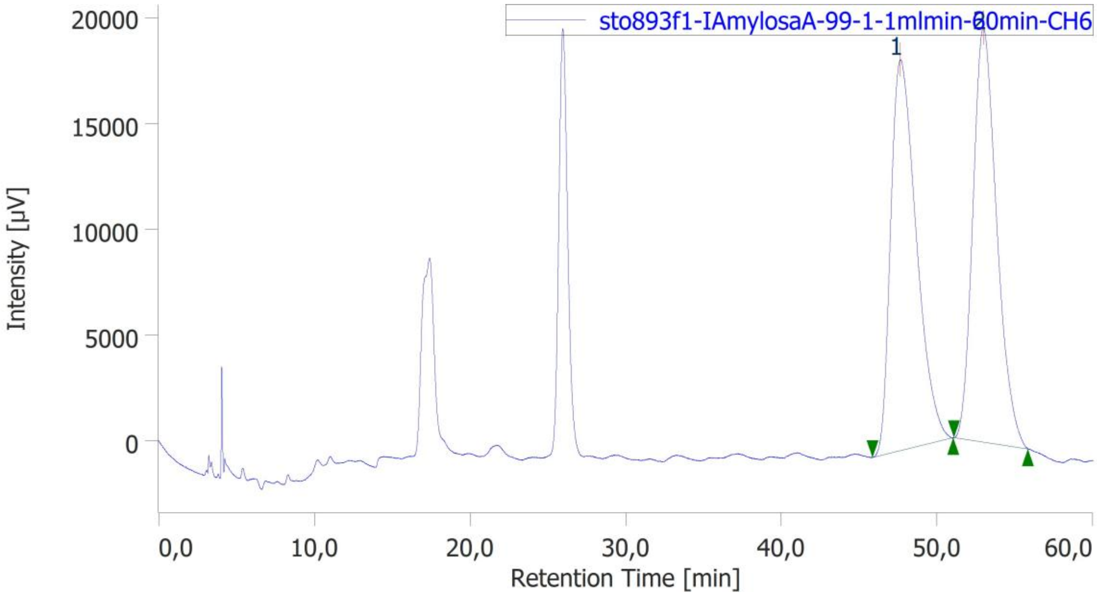
HRMS (ESI-TOF): m/z calculated for $C_{28}H_{27}F_3NO_6S$ $[M+H]^+$: 562.1511, found 562.1504.

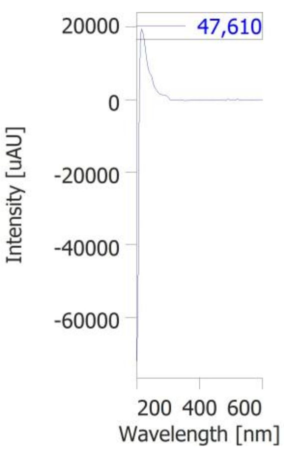


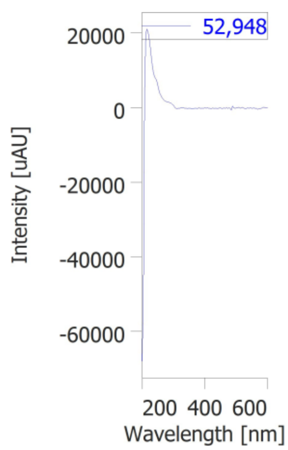


Peak Information

#	Peak Name	CH	tR [min]	Area [μV·sec]	Height [μV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	48,452	411632	4079	3,572	4,047	N/A	5166	1,677	1,102	
2	Unknown	6	53,177	11112163	96691	96,428	95,953	N/A	5182	N/A	1,426	



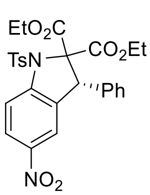




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	47,610	2116046	18496	50,392	48,556	N/A	3950	1,841	1,524	
2	Unknown	6	52,948	2083143	19596	49,608	51,444	N/A	5788	N/A	1,258	

Diethyl (*R*)-5-nitro-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3o)

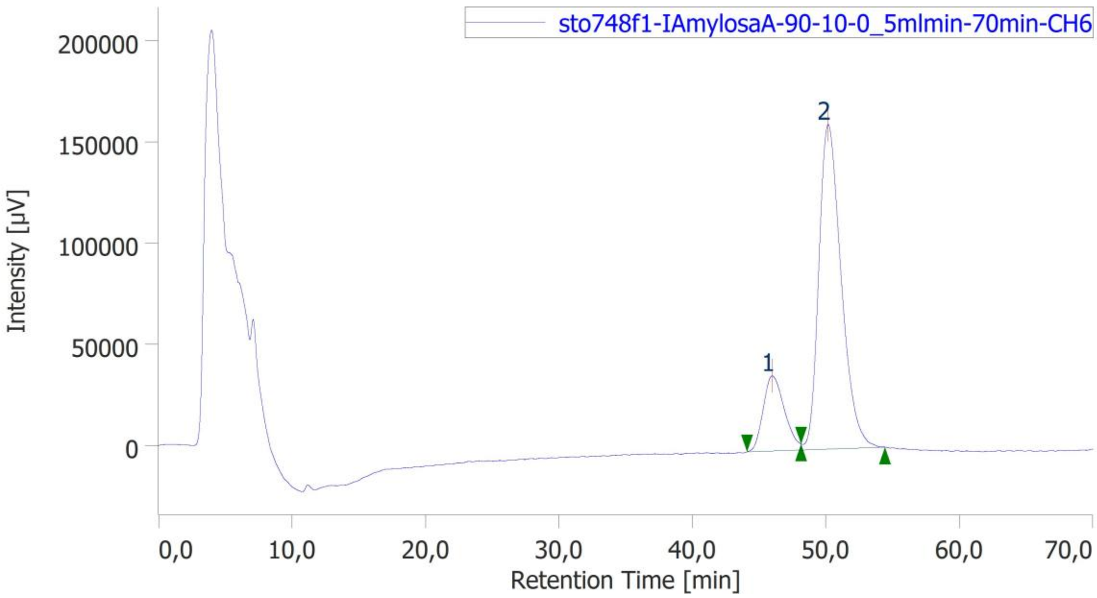


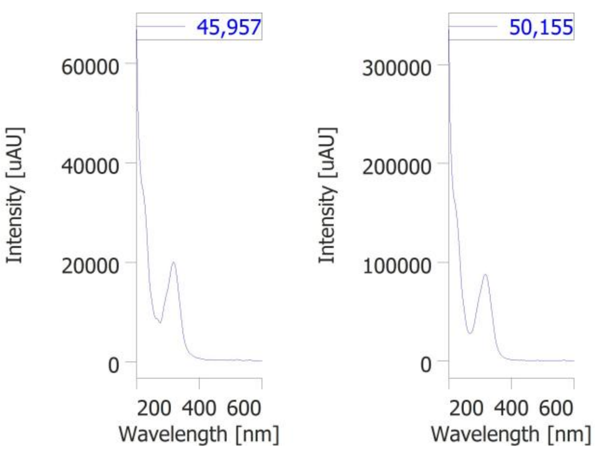
General procedure was followed to obtain **3o** as a yellow solid (34.0 mg, 63% yield). The enantiomeric ratio was found to be 18:82 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 0.5 mL/min, λ= 220 nm, tr (minor): 45.957 min; tr (major): 50.155 min. **M.p.:** 146-147 ºC. **R*f* =** 0.22 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** +53 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.16 – 8.07 (m, 3H), 7.86 (dd, *J* = 2.3, 1.1 Hz, 1H), 7.39 – 7.28 (m, 5H), 7.24 (d, *J* = 9.0 Hz, 1H), 7.04 (d, *J* = 6.8 Hz, 2H), 5.41 (s, 1H), 4.42 (q, *J* = 7.1 Hz, 2H), 3.89 – 3.68 (m, 2H), 2.44 (s, 3H), 1.39 (t, *J* = 7.1 Hz, 3H), 0.96 (t, *J* = 7.1 Hz, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 168.1 (C), 164.5 (C), 147.3 (C), 145.1 (C), 143.9 (C), 136.8 (C), 136.6 (C), 131.3 (C), 130.0 (2 x CH), 129.8 (2 x CH), 128.9 (CH), 128.7 (2 x CH), 128.6 (2 x CH), 125.6 (CH), 121.9 (CH), 112.5 (CH), 83.1 (C), 63.7 (CH$_2$), 62.8 (CH$_2$), 55.7 (CH), 21.8 (CH$_3$), 14.1 (CH$_3$), 13.6 (CH$_3$).

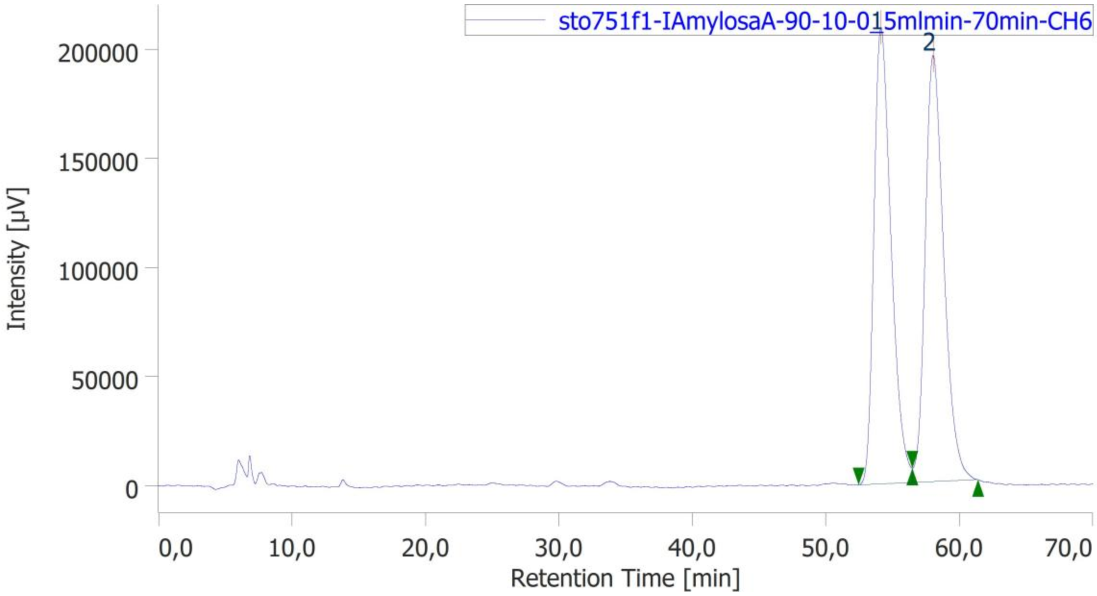
HRMS (ESI-TOF): m/z calculated for $C_{27}H_{27}N_2O_8S$ [M+H]$^+$: 539.1488, found 539.1483.

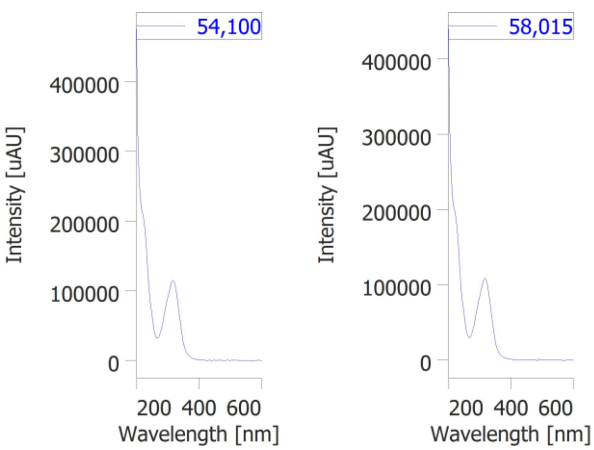




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	45,957	4090691	37160	17,966	18,823	N/A	3960	1,415	N/A	
2	Unknown	6	50,155	18678713	160260	82,034	81,177	N/A	4387	N/A	1,343	

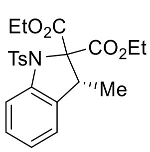




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	54,100	18794981	209125	49,813	51,693	N/A	8539	1,620	1,425	
2	Unknown	6	58,015	18936260	195430	50,187	48,307	N/A	8594	N/A	1,277	

Diethyl (*R*)-3-methyl-1-tosylindoline-2,2-dicarboxylate (3p)

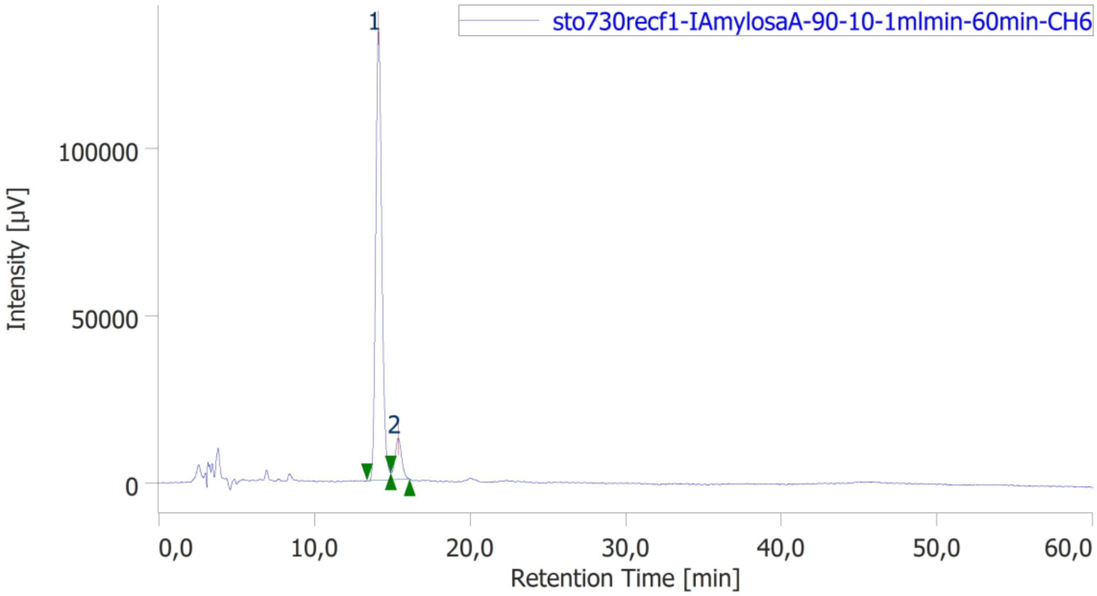


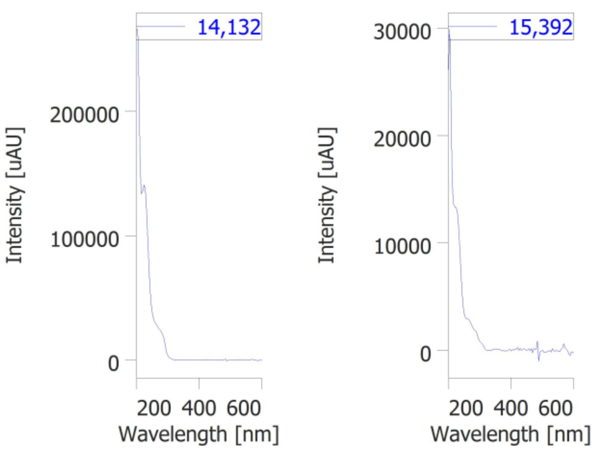
General procedure was followed to obtain **3p** as a white solid (25.9 mg, 60% yield). The enantiomeric ratio was found to be 91:9 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 14.132 min, tr (minor): 15.392 min. **M.p.:** 99-100 ºC. $\mathbf{R_f}$ **=** 0.43 (Hexane/EtOAc 8:2). $[\boldsymbol{\alpha}]_{\boldsymbol{D}}^{\mathbf{25}}$ **=** -4 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.12 (d, *J* = 8.4 Hz, 2H), 7.30 (d, *J* = 8.4 Hz, 2H), 7.10 (d, *J* = 4.2 Hz, 2H), 7.07 (d, *J* = 7.4 Hz, 1H), 7.00 – 6.91 (m, 1H), 4.39 – 4.26 (m, 4H), 4.06 (q, *J* = 7.0 Hz, 1H), 2.40 (s, 3H), 1.38 (d, *J* = 7.0 Hz, 3H), 1.34 – 1.28 (m, 6H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 168.9 (C), 166.0 (C), 144.0 (C), 140.8 (C), 138.0 (C), 132.0 (C), 129.6 (2 x CH), 128.3 (CH), 128.3 (2 x CH), 123.7 (CH), 123.1 (CH), 113.0 (CH), 81.1 (C), 62.9 (CH_2), 62.6 (CH_2), 45.7 (CH), 29.9 (CH_3), 21.7 (CH_3), 14.1 (CH_3), 14.1 (CH_3).

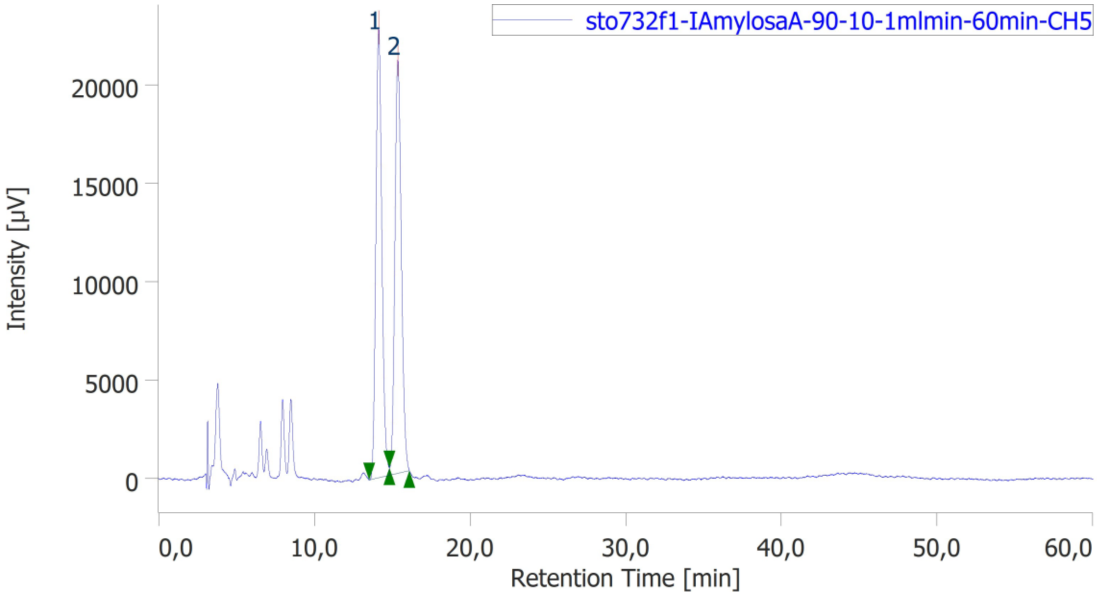
HRMS (ESI-TOF): m/z calculated for $C_{22}H_{26}NO_6S$ $[M+H]^+$: 432.1481, found 432.1473.

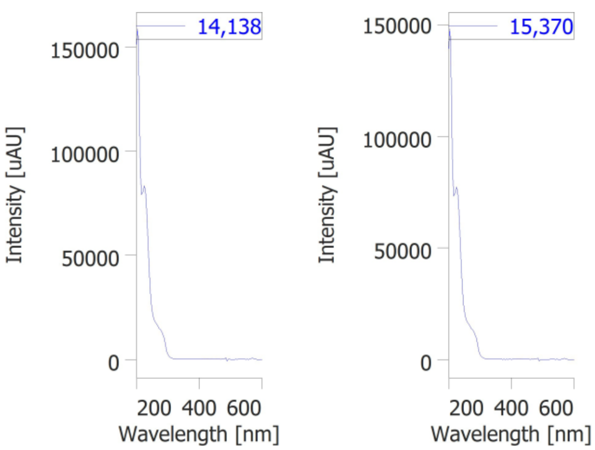




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	14,132	3659688	135199	90,736	91,606	N/A	6493	1,717	1,203	
2	Unknown	6	15,392	373652	12388	9,264	8,394	N/A	6398	N/A	N/A	

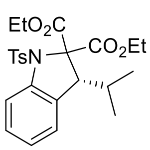




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	5	14,138	610564	22856	50,158	52,105	N/A	6567	1,695	1,174	
2	Unknown	5	15,370	606711	21009	49,842	47,895	N/A	6562	N/A	1,151	

Diethyl (*R*)-3-isopropyl-1-tosylindoline-2,2-dicarboxylate (3q)

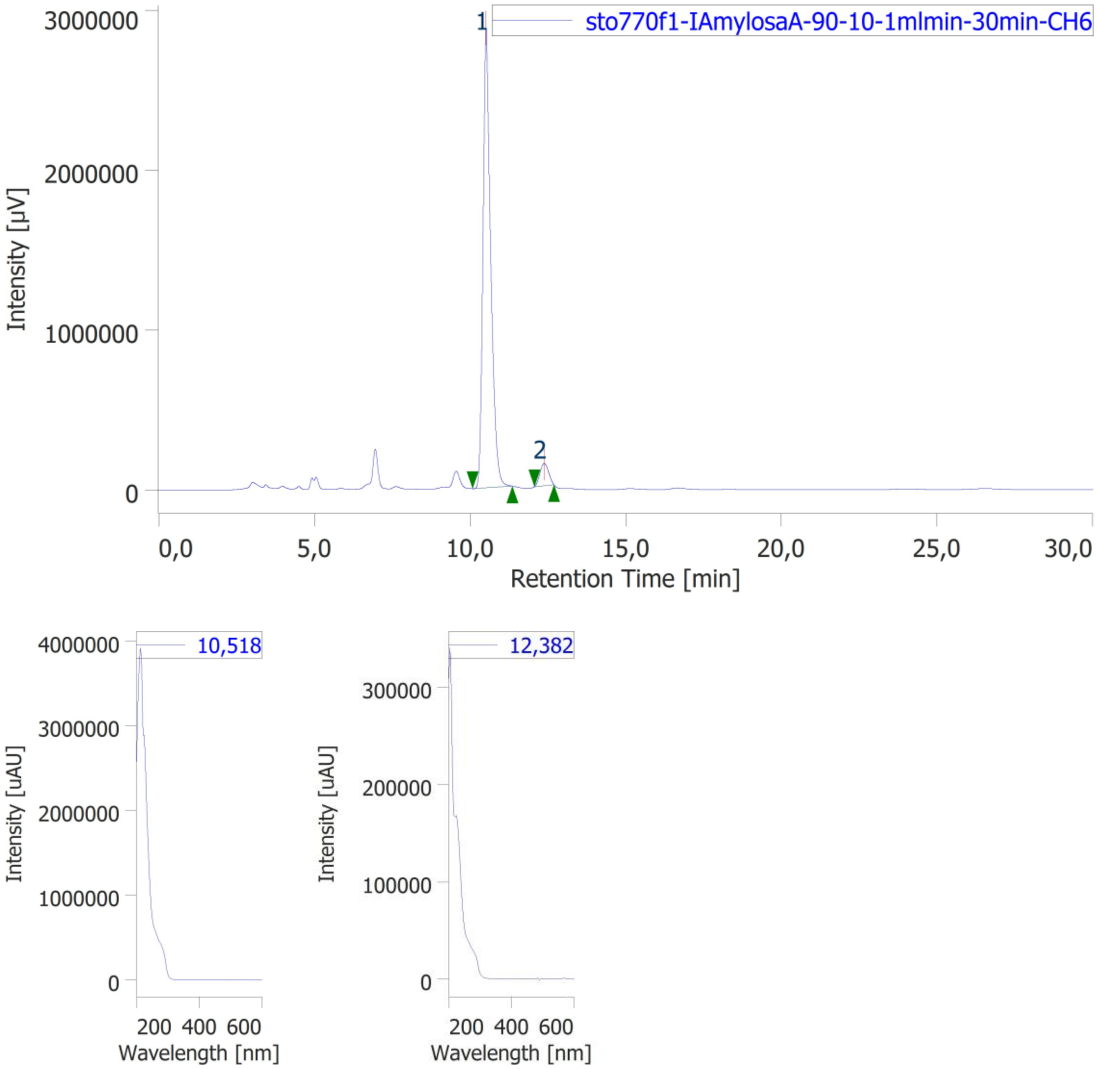


General procedure was followed to obtain **3q** as a white solid (27.6 mg, 60% yield). The enantiomeric ratio was found to be 95:5 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 10.518 min, tr (minor): 12.382 min. **M.p.:** 106-107 ºC. **R_f =** 0.44 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -32 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.15 (d, *J* = 8.4 Hz, 2H), 7.29 (d, *J* = 8.4 Hz, 2H), 7.21 (d, *J* = 7.8 Hz, 1H), 7.16 – 7.08 (m, 2H), 6.92 (t, *J* = 7.8 Hz, 1H), 4.36 – 4.24 (m, 4H), 3.94 (d, *J* = 3.1 Hz, 1H), 2.40 (s, 3H), 2.13 – 1.97 (m, 1H), 1.34 (t, *J* = 7.2 Hz, 3H), 1.29 (t, *J* = 7.2 Hz, 3H), 1.08 (d, *J* = 6.9 Hz, 3H), 0.52 (d, *J* = 6.9 Hz, 3H).

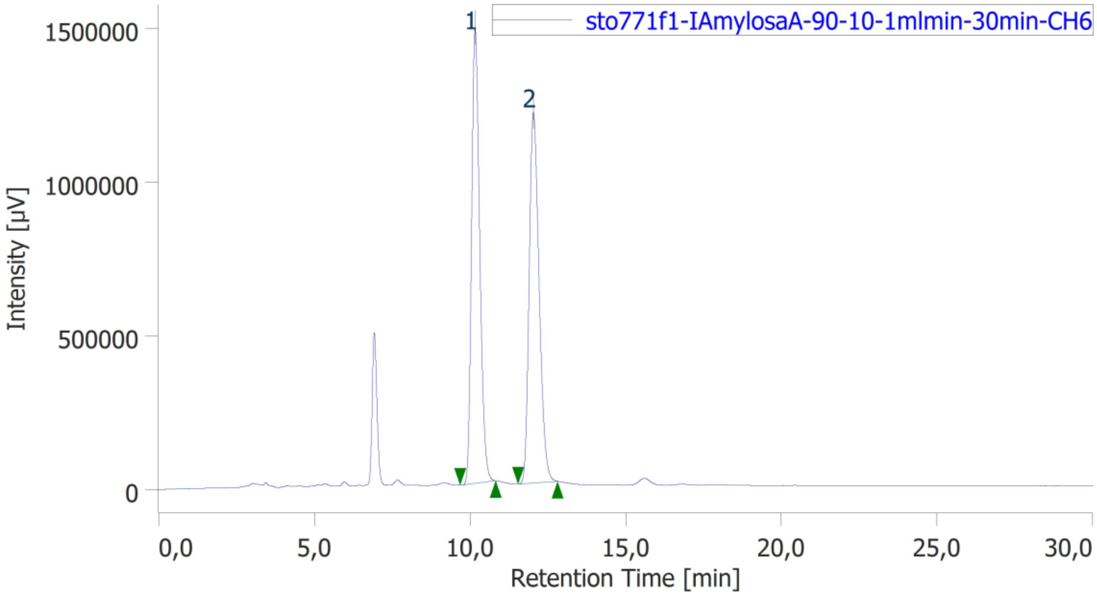
^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 169.2 (C), 165.9 (C), 144.0 (C), 141.3 (C), 138.0 (C), 129.6 (2 x CH), 128.5 (CH), 128.3 (2 x CH), 128.0 (C), 125.7 (CH), 122.6 (CH), 113.1 (CH), 82.7 (C), 63.1 (CH_2), 62.8 (CH_2), 55.5 (CH), 30.0 (CH), 22.8 (CH_3), 21.7 (CH_3), 17.4 (CH_3), 14.0 (CH_3), 14.0 (CH_3).

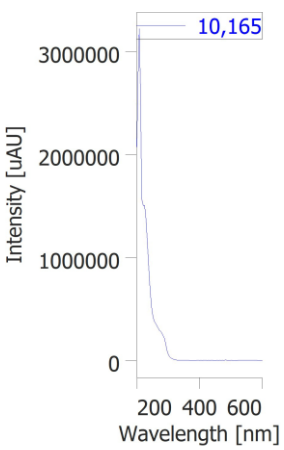
HRMS (ESI-TOF): m/z calculated for $C_{24}H_{30}NO_6S$ $[M+H]^+$: 460.1794, found 460.1783.

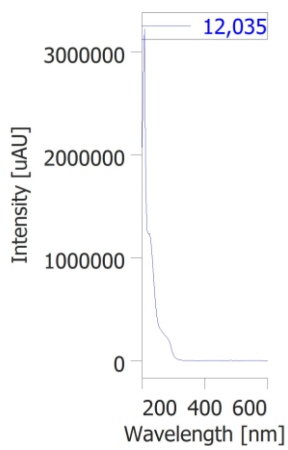


Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	10,518	49060809	2872806	94,830	95,349	N/A	9431	3,872	1,360	
2	Unknown	6	12,382	2674586	140125	5,170	4,651	N/A	8677	N/A	1,022	



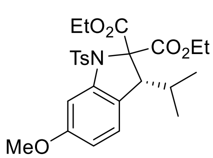




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	10,165	26744750	1481150	50,144	55,127	N/A	7424	3,569	1,251	
2	Unknown	6	12,035	26591254	1205632	49,856	44,873	N/A	6921	N/A	1,276	

Diethyl (*R*)-3-isopropyl-6-methoxy-1-tosylindoline-2,2-dicarboxylate (3r)

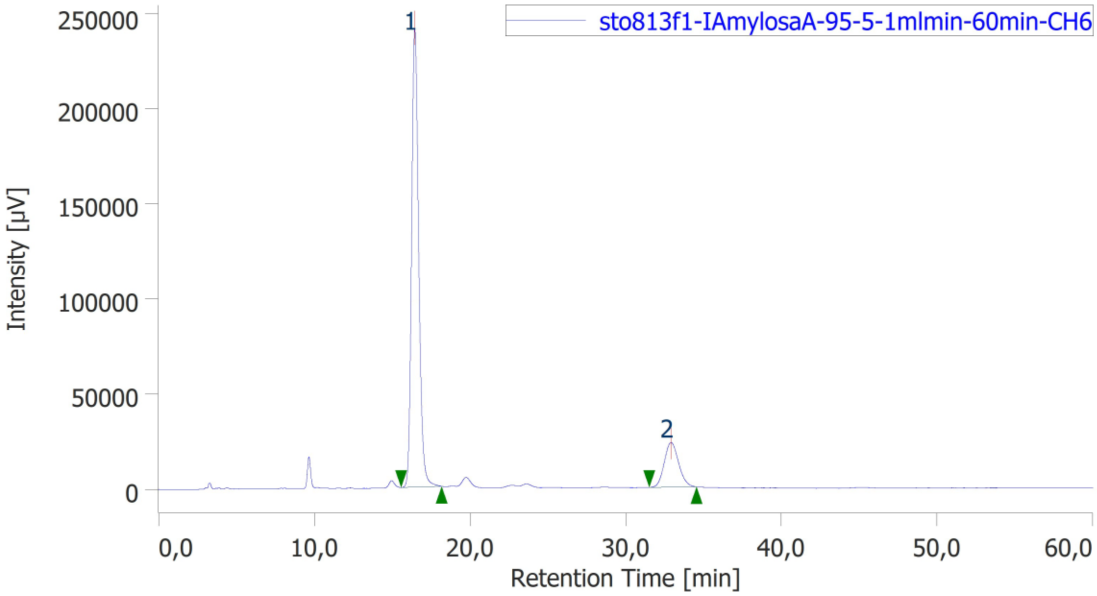


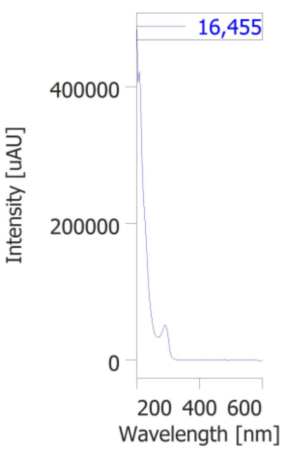
General procedure was followed to obtain **3r** as a white solid (30.9 mg, 63% yield). The enantiomeric ratio was found to be 83.5:16.5 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 95:5 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 16.455 min, tr (minor): 32.905 min. **M.p.:** 118-120 ºC. **R*f* =** 0.33 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -66 (c = 0.1, $CHCl_3$).

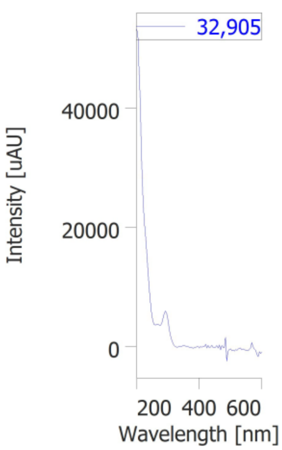
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.15 (d, *J* = 8.4 Hz, 2H), 7.29 (d, *J* = 8.4 Hz, 2H), 7.01 (d, *J* = 8.3 Hz, 1H), 6.81 (d, *J* = 2.3 Hz, 1H), 6.45 (dd, *J* = 8.3, 2.3 Hz, 1H), 4.36 – 4.24 (m, 4H), 3.86 (d, *J* = 3.1 Hz, 1H), 3.72 (s, 3H), 2.40 (s, 3H), 2.08 – 1.88 (m, 1H), 1.38 – 1.23 (m, 6H), 1.05 (d, *J* = 6.9 Hz, 3H), 0.51 (d, *J* = 6.9 Hz, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 169.3 (C), 165.9 (C), 160.2 (C), 144.0 (C), 142.4 (C), 138.0 (C), 129.6 (2 x CH), 128.3 (2 x CH), 126.0 (CH), 120.0 (C), 107.7 (CH), 100.2 (CH), 83.3 (C), 63.1 (CH$_2$), 62.8 (CH$_2$), 55.5 (CH), 54.8 (CH$_3$), 30.1 (CH), 22.8 (CH$_3$), 21.7 (CH$_3$), 17.4 (CH$_3$), 14.0 (2 x CH$_3$).

HRMS (ESI-TOF): m/z calculated for $C_{25}H_{32}NO_7S$ $[M+H]^+$: 490.1899, found 490.1892.

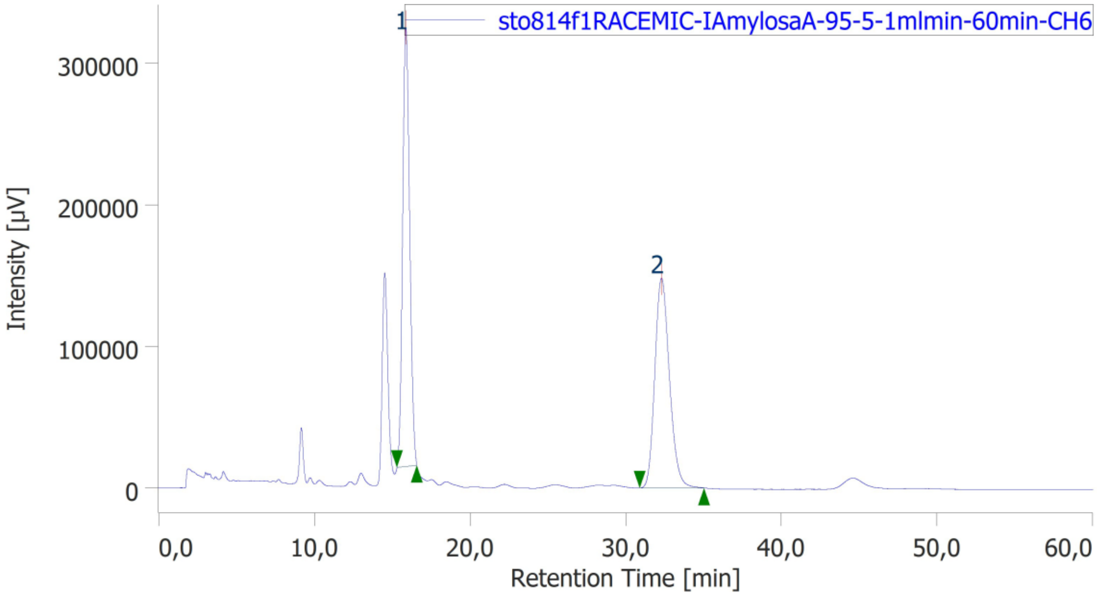


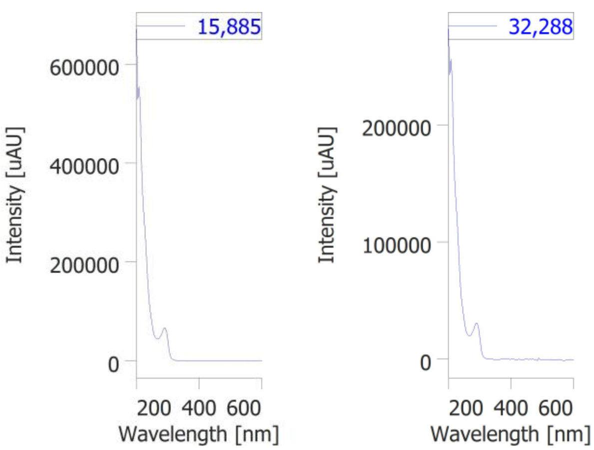




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	16,455	7595407	240912	83,520	91,131	N/A	6596	13,214	1,218	
2	Unknown	6	32,905	1498756	23445	16,480	8,869	N/A	6095	N/A	1,124	

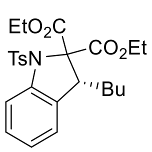




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	15,885	9659294	309544	50,032	67,660	N/A	5827	12,999	1,135	
2	Unknown	6	32,288	9647028	147958	49,968	32,340	N/A	5784	N/A	1,204	

Diethyl (*R*)-3-butyl-1-tosylindoline-2,2-dicarboxylate (3s)

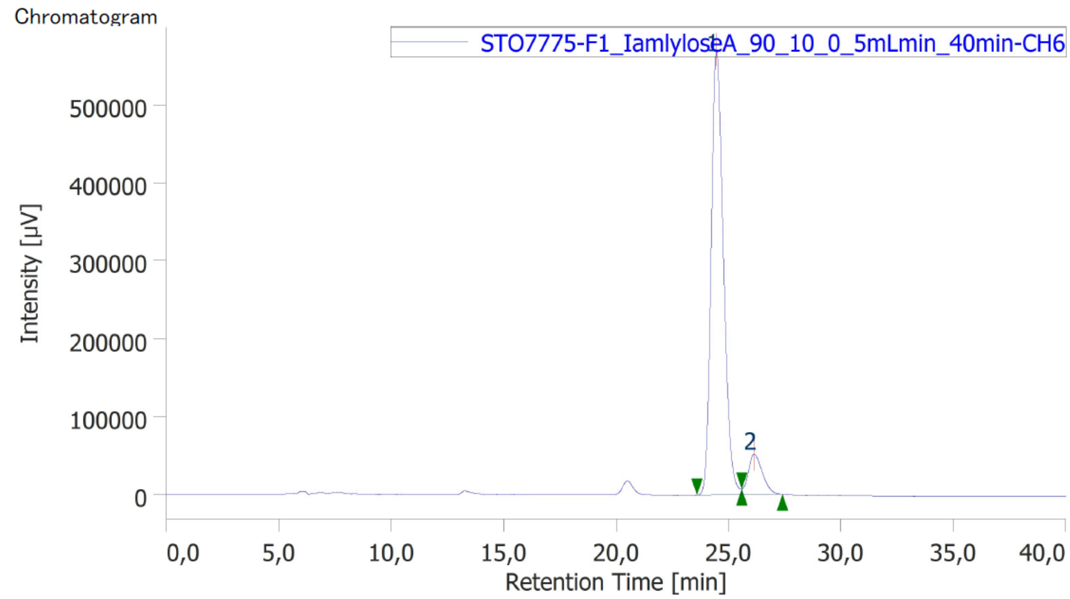


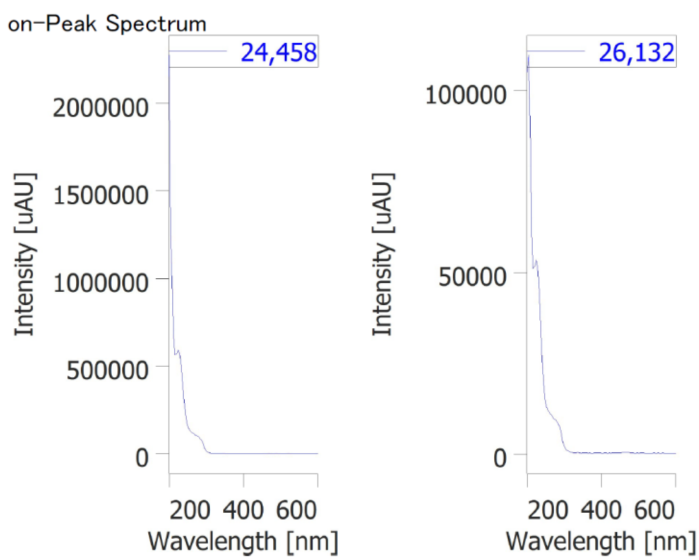
General procedure was followed to obtain **3s** as a white solid (21.8 mg, 46% yield). The enantiomeric ratio was found to be 90.5:9.5 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 0.5 mL/min, λ= 220 nm, tr (major): 24.458 min, tr (minor): 26.132 min. **M.p.:** 102-104 ºC. **R$_f$ =** 0.52 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -20 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.11 (d, *J* = 8.4 Hz, 2H), 7.29 (d, *J* = 8.4 Hz, 2H), 7.17 – 7.01 (m, 3H), 6.95 – 6.86 (m, 1H), 4.46 – 4.19 (m, 4H), 3.97 (t, *J* = 7.2 Hz, 1H), 2.40 (s, 3H), 1.85 – 1.72 (m, 1H), 1.71 – 1.61 (m, 1H), 1.50 – 1.21 (m, 10H), 0.90 (t, *J* = 7.1 Hz, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 169.1 (C), 166.1 (C), 144.0 (C), 140.5 (C), 137.8 (C), 131.0 (C), 129.7 (2 x CH), 128.3 (2 x CH), 128.3 (CH), 124.6 (CH), 122.8 (CH), 113.0 (CH), 81.6 (C), 63.0 (CH$_2$), 62.7 (CH$_2$), 50.6 (CH), 31.9 (CH$_2$), 29.7 (CH$_2$), 22.8 (CH$_2$), 21.7 (CH$_3$), 14.1 (CH$_3$), 14.0 (CH$_3$), 14.0 (CH$_3$).

HRMS (ESI-TOF): m/z calculated for $C_{25}H_{32}NO_6S$ $[M+H]^+$: 474.1950, found 474.1942.





Peak Information

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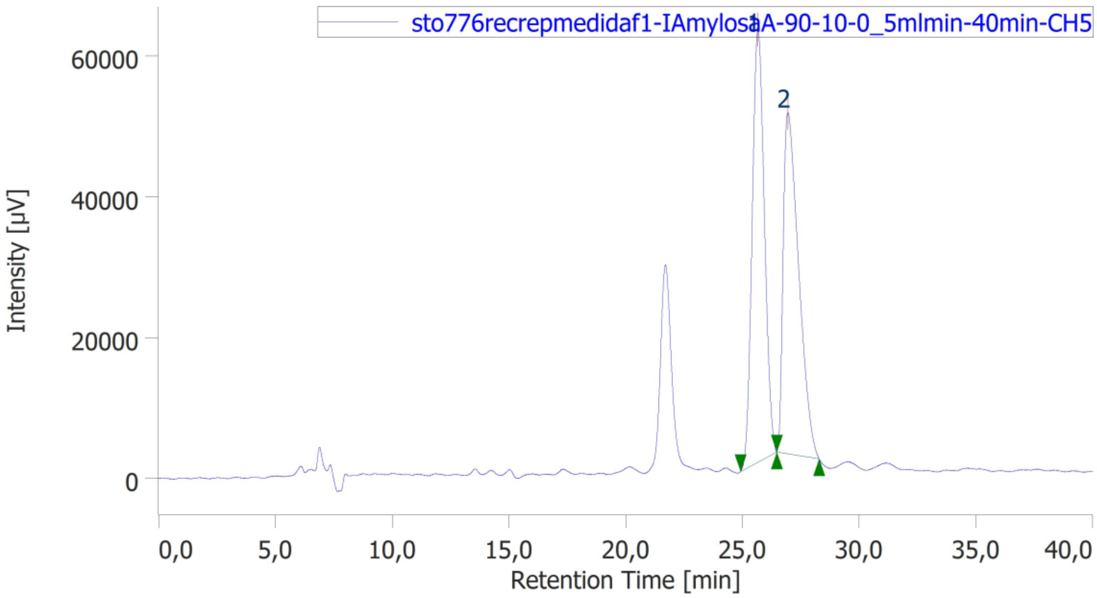
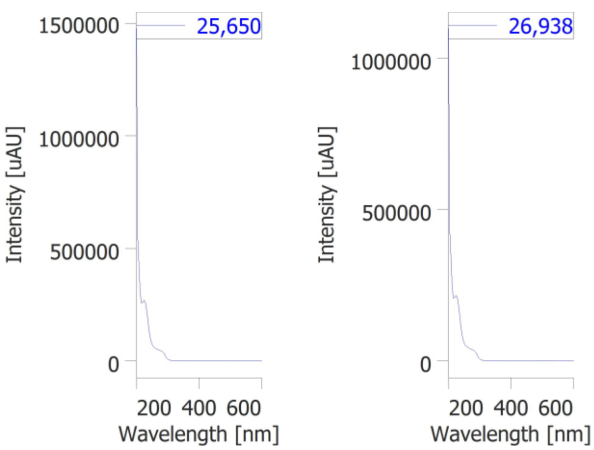
1	Unknown	6	24,458	21610330	571490	90,487	91,674	N/A	9825	1,573	1,238	
2	Unknown	6	26,132	2271818	51903	9,513	8,326	N/A	8318	N/A	N/A	

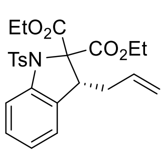




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	5	25,650	2238986	61393	50,092	55,896	N/A	11015	1,164	1,107	
2	Unknown	5	26,938	2230757	48441	49,908	44,104	N/A	7519	N/A	1,925	

Diethyl (*R*)-3-allyl-1-tosylindoline-2,2-dicarboxylate (3t)



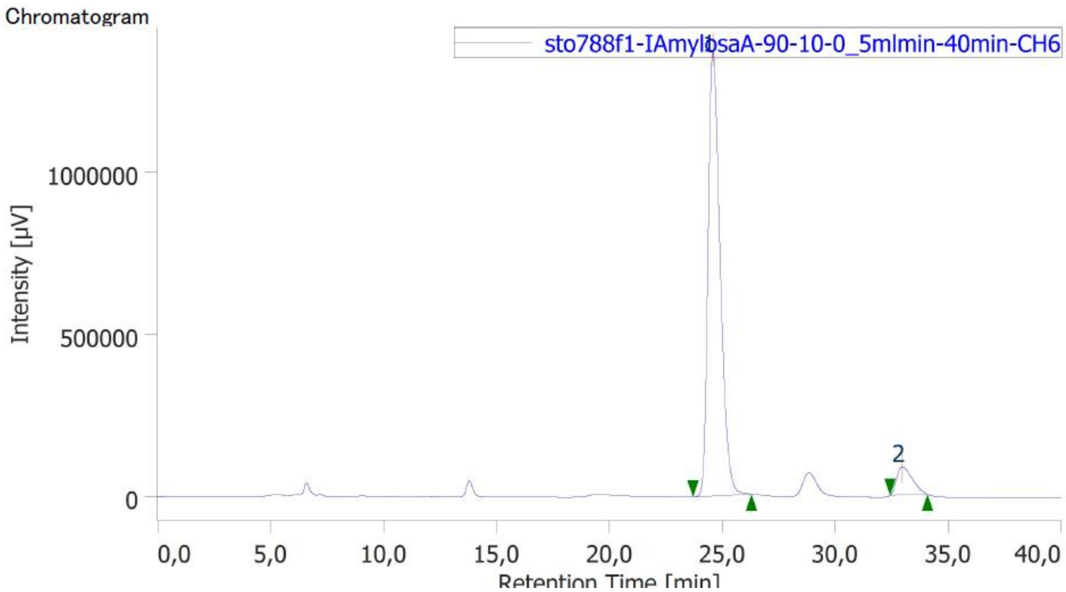
General procedure was followed to obtain **3t** as a white solid (26.1 mg, 57% yield). The enantiomeric ratio was found to be 92.5:7.5 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 0.5 mL/min, λ= 220 nm, tr (major): 24.575 min, tr (minor): 32.957 min. **M.p.:** 103-104 ºC. **R*f* =** 0.50 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -16 (c = 0.1, $CHCl_3$).

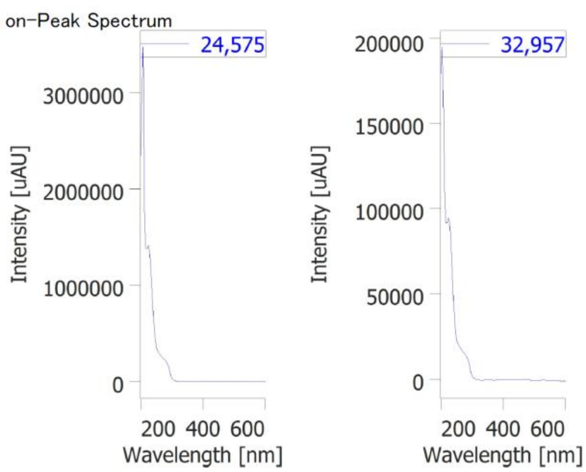
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.13 (d, *J* = 8.4 Hz, 2H), 7.30 (d, *J* = 8.4 Hz, 2H), 7.13 (d, *J* = 7.5 Hz, 1H), 7.08 (d, *J* = 3.7 Hz, 2H), 6.98 – 6.78 (m, 1H), 5.86 (ddt, *J* = 17.1, 10.3, 6.6 Hz, 1H), 5.21 – 4.98 (m, 2H), 4.40 –

4.20 (m, 4H), 4.12 (t, *J* = 7.5 Hz, 1H), 2.74 – 2.57 (m, 1H), 2.40 (m, 4H), 1.32 (t, *J* = 7.1 Hz, 3H), 1.31 (t, *J* = 7.1 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 169.0 (C), 166.0 (C), 144.1 (C), 140.5 (C), 137.8 (C), 135.3 (CH), 130.3 (C), 129.7 (2 x CH), 128.5 (CH), 128.4 (2 x CH), 124.9 (CH), 122.8 (CH), 117.7 (CH_2), 112.9 (CH), 80.9 (C), 63.1 (CH_2), 62.8 (CH_2), 49.6 (CH), 36.5 (CH_2), 21.7 (CH_3), 14.0 (CH_3), 14.0 (CH_3).

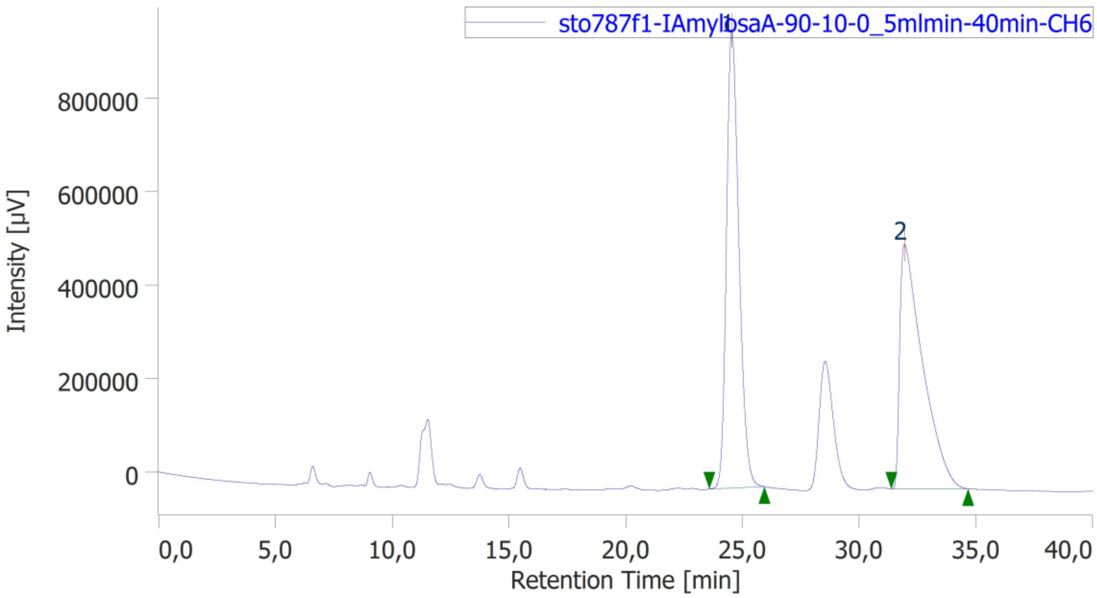
HRMS (ESI-TOF): m/z calculated for $C_{24}H_{28}NO_6S$ $[M+H]^+$: 458.1637, found 458.1629.

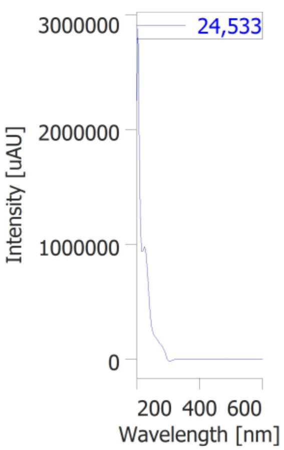


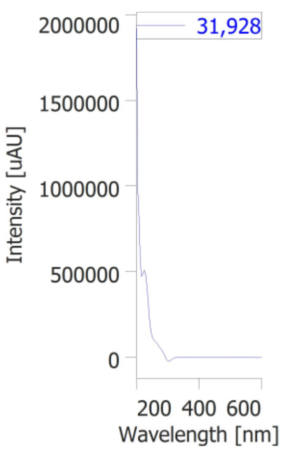


Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	24,575	50962440	1374540	92,404	94,035	N/A	10296	7,357	1,391	
2	Unknown	6	32,957	4189496	87187	7,596	5,965	N/A	10037	N/A	1,523	



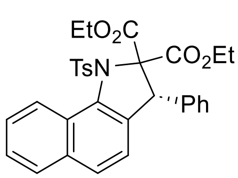




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	24,533	36178167	979225	50,440	65,174	N/A	10376	5,469	1,281	
2	Unknown	6	31,928	35546610	523260	49,560	34,826	N/A	5337	N/A	3,123	

Diethyl (*R*)-3-phenyl-1-tosyl-1,3-dihydro-2*H*-benzo[*g*]indole-2,2-dicarboxylate (3u)

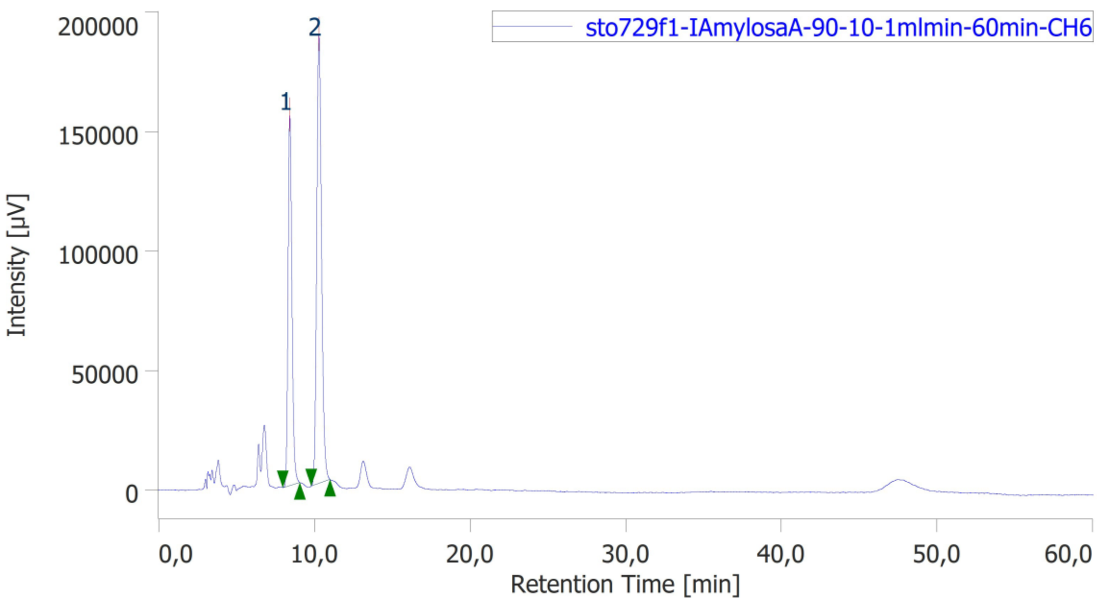


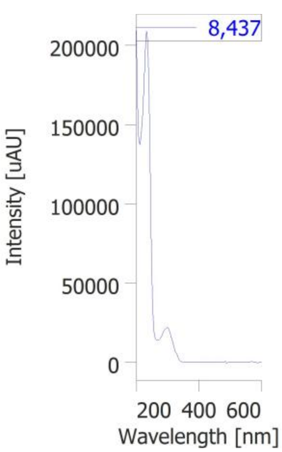
General procedure was followed to obtain **3u** as a white solid (14.1 mg, 26% yield). The enantiomeric ratio was found to be 40:60 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (minor): 8.437 min; tr (major): 10.305 min. **M.p.:** 132-133 ºC. **R*f* =** 0.48 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -2 (c = 0.1, $CHCl_3$).

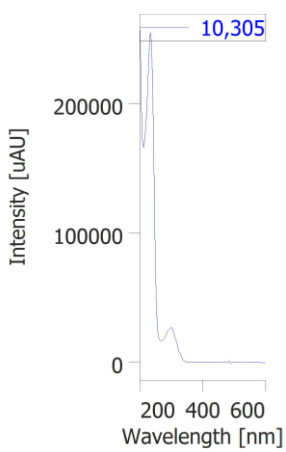
^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 8.49 (d, *J* = 8.4 Hz, 1H), 7.83 (d, *J* = 7.7 Hz, 1H), 7.67 (d, *J* = 8.3 Hz, 1H), 7.58 – 7.46 (m, 2H), 7.42 (d, *J* = 8.3 Hz, 2H), 7.33 – 7.20 (m, 3H), 7.15 – 7.06 (m, 4H), 6.91 (d, *J* = 8.2 Hz, 1H), 5.26 (s, 1H), 4.41 (dq, *J* = 10.7, 7.2 Hz, 1H), 4.24 (dq, *J* = 10.7, 7.2 Hz, 1H), 3.81 (dq, *J* = 10.7, 7.2 Hz, 1H), 3.34 (dq, *J* = 10.7, 7.2 Hz, 1H), 2.36 (s, 3H), 1.22 (t, *J* = 7.2 Hz, 3H), 0.69 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 166.0 (C), 165.6 (C), 144.1 (C), 140.7 (C), 136.9 (C), 136.3 (C), 134.4 (C), 132.9 (C), 130.0 (2 x CH), 129.1 (2 x CH), 128.13 (2 x CH), 128.11 (2 x CH), 128.03 (CH), 128.00 (CH), 127.9 (CH), 126.62 (C), 126.59 (CH), 126.4 (CH), 125.8 (CH), 122.4 (CH), 85.7 (C), 62.8 (CH$_2$), 61.8 (CH$_2$), 55.7 (CH), 21.7 (CH$_3$), 13.7 (CH$_3$), 13.2 (CH$_3$).

HRMS (ESI-TOF): m/z calculated for $C_{31}H_{30}NO_6S$ $[M+H]^+$: 544.1794, found 544.1784.

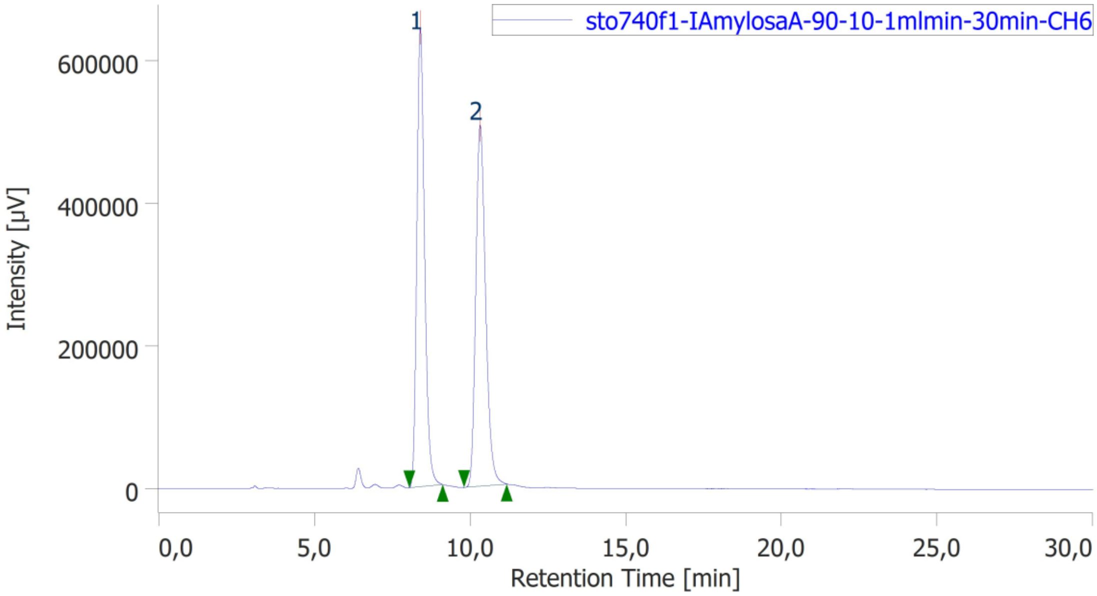


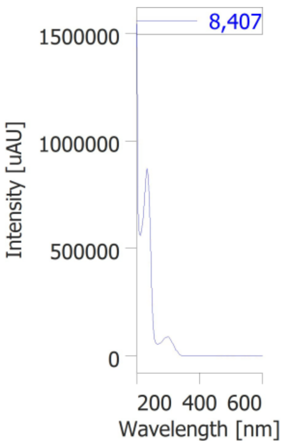


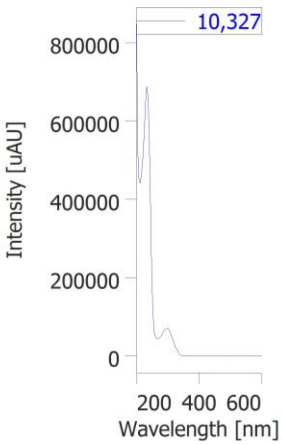


Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	8,437	2680076	155141	39,844	45,216	N/A	5723	3,726	1,218	
2	Unknown	6	10,305	4046330	187968	60,156	54,784	N/A	5427	N/A	1,197	



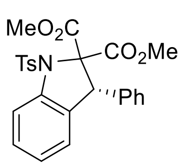




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	8,407	11103759	643704	50,126	55,945	N/A	5712	3,820	1,239	
2	Unknown	6	10,327	11048125	506903	49,874	44,055	N/A	5382	N/A	1,248	

Dimethyl (*R*)-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3v)

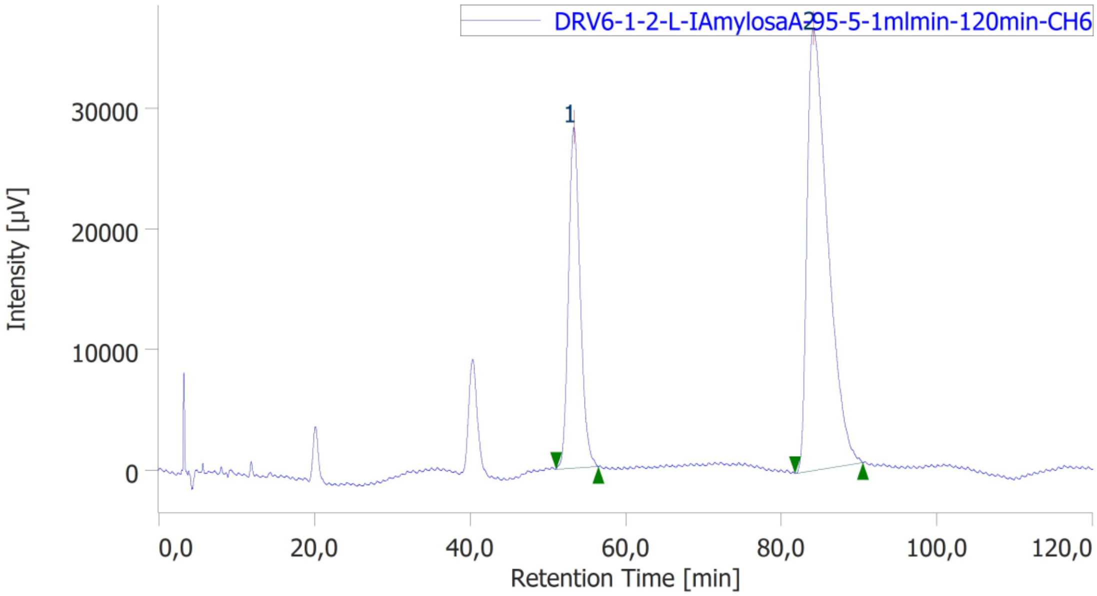


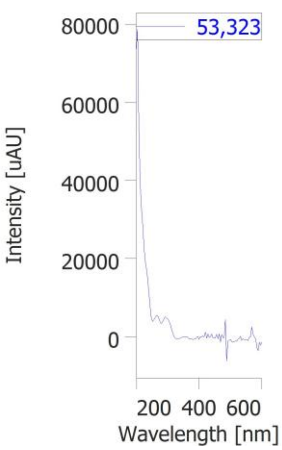
General procedure was followed to obtain **3v** as a white solid (46.6 mg, >99% yield). The enantiomeric ratio was found to be 30:70 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 95:5 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (minor): 53.323 min; tr (major): 84.075 min. **M.p.:** 108-110 ºC. **R$_f$ =** 0.39 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -70 (c = 0.1, $CHCl_3$).

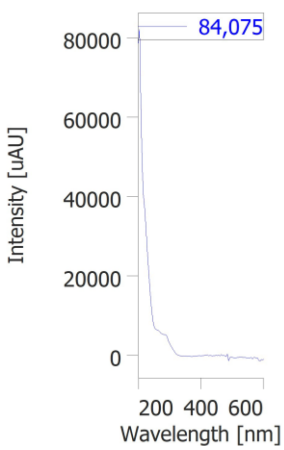
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.08 (d, J = 8.1 Hz, 2H), 7.36 – 7.23 (m, 5H), 7.24 – 7.17 (m, 2H), 7.06 – 7.00 (m, 2H), 7.00 – 6.95 (m, 2H), 5.36 (s, 1H), 3.92 (s, 3H), 3.29 (s, 3H), 2.42 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 169.3 (C), 165.5 (C), 144.2 (C), 141.9 (C), 137.9 (C), 137.7 (C), 129.8 (2 x CH), 129.7 (2 x CH), 129.4 (C), 128.9 (CH), 128.4 (3 x CH), 128.3 (2 x CH), 125.9 (CH), 123.5 (CH), 113.1 (CH), 82.2 (C), 56.7 (CH), 54.0 (CH_3), 52.7 (CH_3), 21.7 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{25}H_{23}NNaO_6S$ $[M+Na]^+$: 488.1144, found 488.1141.

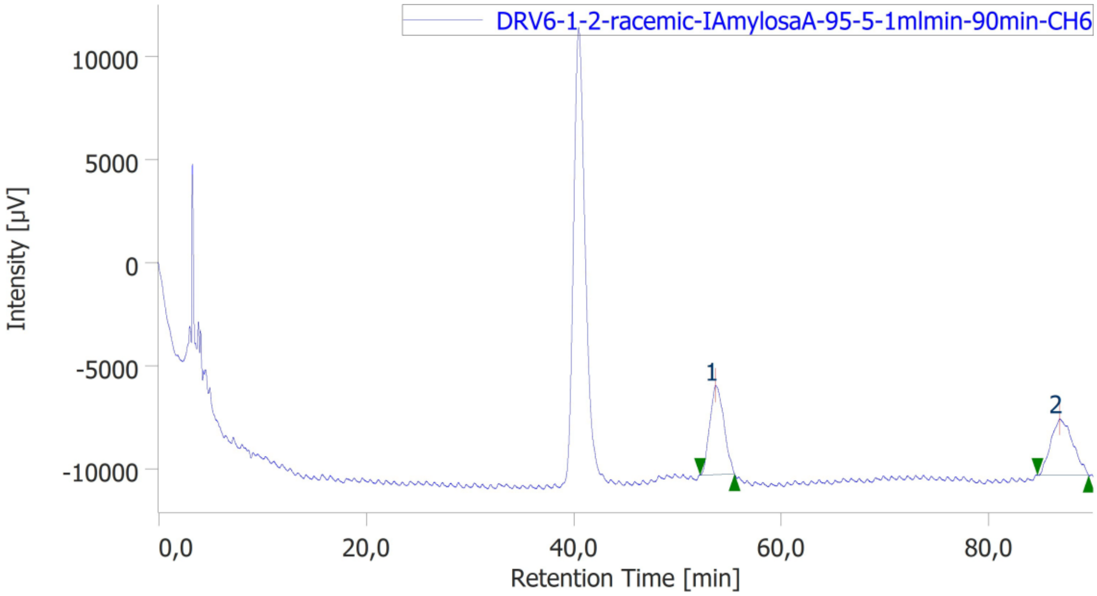


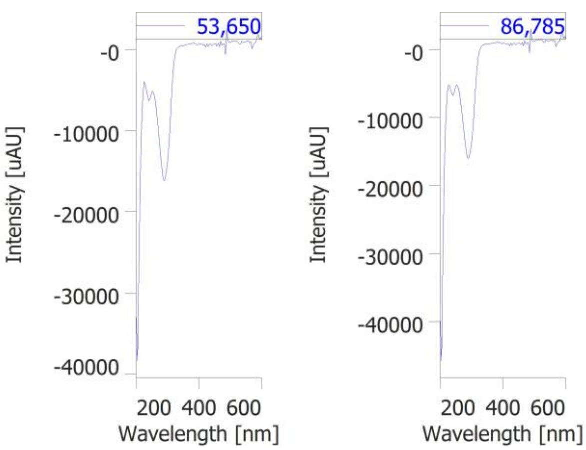




Peak Information

#	Peak Name	CH	tR [min]	Area [μV·sec]	Height [μV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	53,323	2928276	28261	30,235	43,513	N/A	6392	8,214	1,206	
2	Unknown	6	84,075	6756769	36687	69,765	56,487	N/A	4828	N/A	1,970	

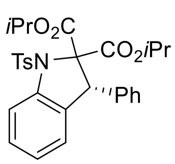




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	53,650	406527	4336	50,306	61,059	N/A	6804	9,931	1,198	
2	Unknown	6	86,785	401578	2765	49,694	38,941	N/A	7206	N/A	1,237	

Diisopropyl (*R*)-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3w)

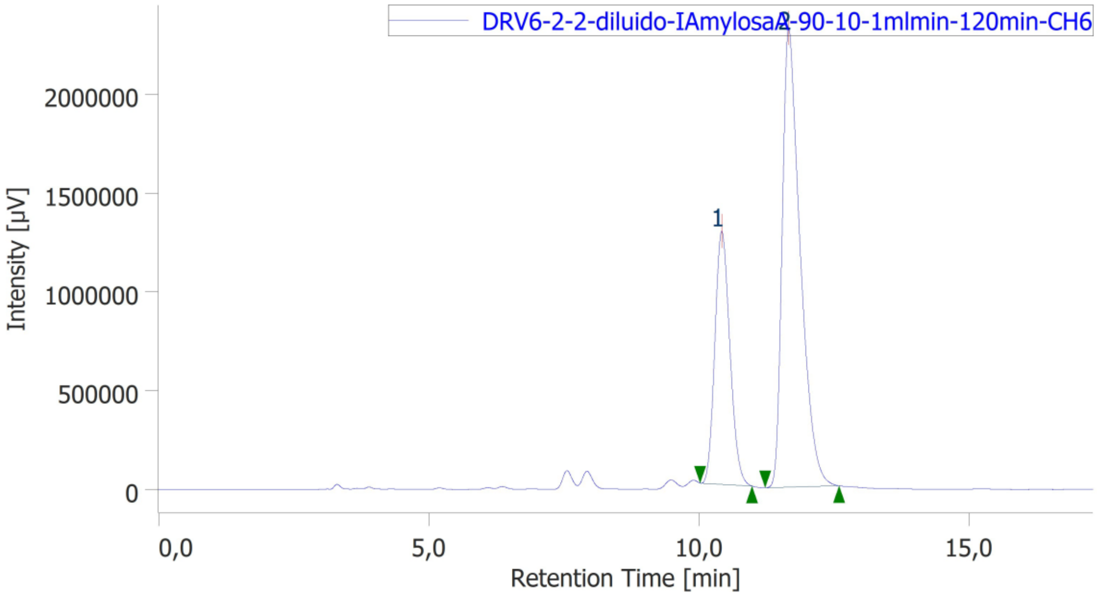


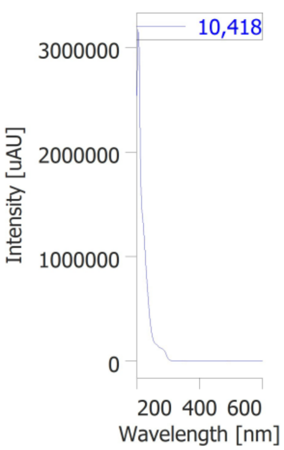
General procedure was followed to obtain **3w** as a white solid (28.8 mg, 55% yield). The enantiomeric ratio was found to be 32:68 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (minor): 10.418 min; tr (major): 11.653 min. **M.p.:** 116-118 ºC. **R_f =** 0.43 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** -11 (c = 0.1, $CHCl_3$).

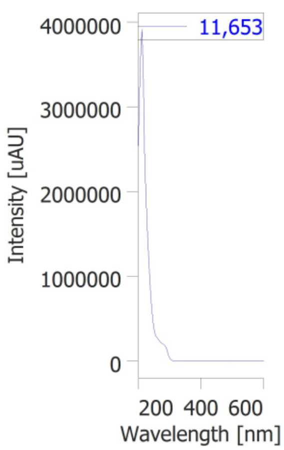
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.15 (d, J = 8.4 Hz, 2H), 7.34 – 7.24 (m, 5H), 7.15 – 7.08 (m, 2H), 7.07 – 7.02 (m, 2H), 7.01 – 6.89 (m, 2H), 5.40 (s, 1H), 5.21 (hept, J = 6.3 Hz, 1H), 4.64 (hept, J = 6.3 Hz, 1H), 2.41 (s, 3H), 1.38 (d, J = 6.3 Hz, 3H), 1.35 (d, J = 6.3 Hz, 3H), 0.96 (d, J = 6.3 Hz, 6H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 168.4 (C), 164.8 (C), 144.0 (C), 138.3 (C), 138.0 (C), 130.0 (2 x CH), 129.7 (C), 129.6 (2 x CH), 128.7 (CH), 128.6 (2 x CH), 128.3 (3 x CH), 128.2 (C), 125.8 (CH), 123.3 (CH), 113.1 (CH), 82.3 (C), 71.3 (CH), 70.8 (CH), 56.0 (CH), 21.7 (CH$_3$), 21.7 (CH$_3$), 21.7 (CH$_3$), 21.4 (CH$_3$), 21.3 (CH$_3$).

HRMS (ESI-TOF): m/z calculated for $C_{29}H_{32}NO_6S$ [M+H]$^+$: 522.1950, found 522.1940.







Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
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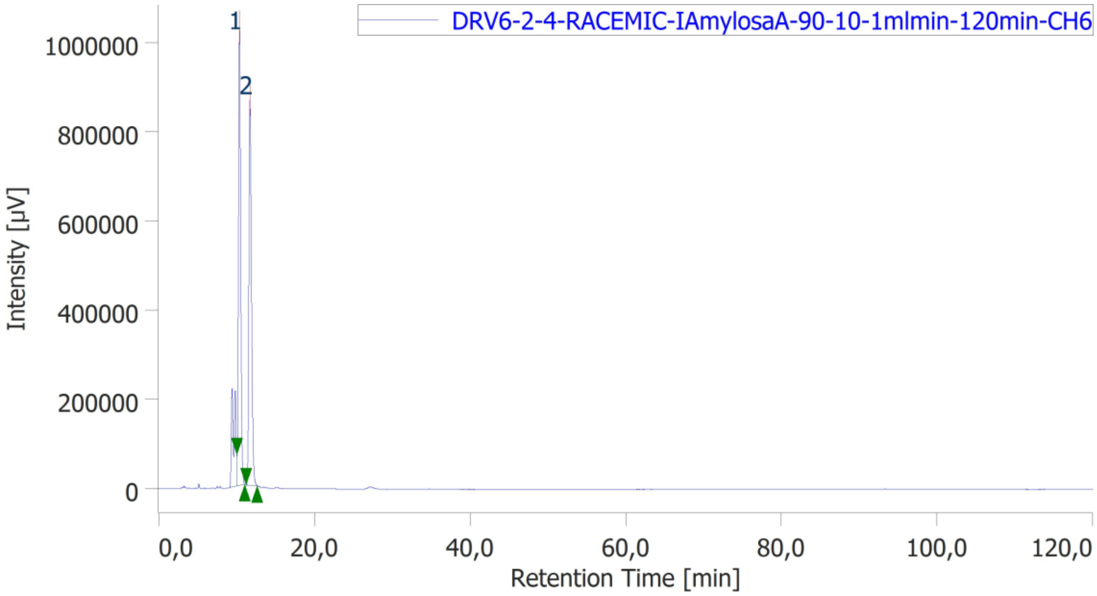
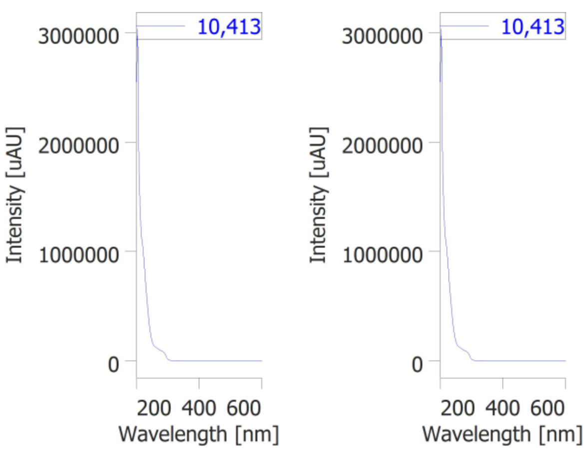
2	Unknown	6	11,653	53717867	2320125	68,471	64,437	N/A	6064	N/A	1,627	



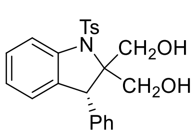


Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	10,413	20430777	1025940	50,312	54,241	N/A	6521	2,400	N/A	
2	Unknown	6	11,760	20176985	865508	49,688	45,759	N/A	5958	N/A	1,346	

3. Derivatizations

(*R*)-(3-phenyl-1-tosylindoline-2,2-diyl)dimethanol (4)

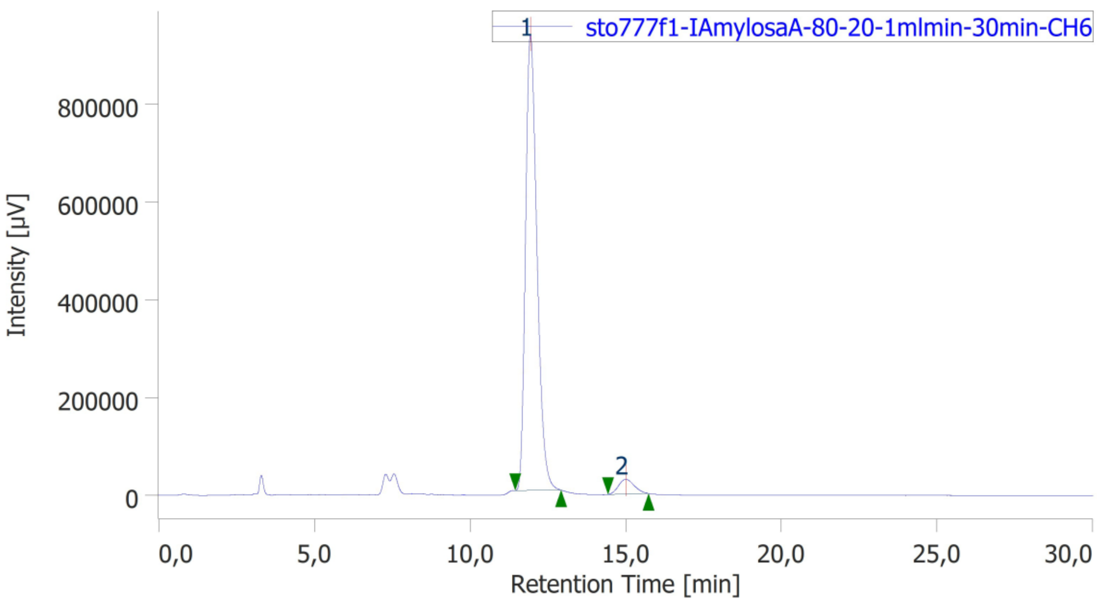


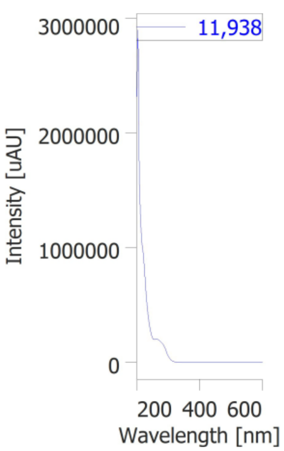
In a Schlenk flask under Ar atmosphere diethyl (*R*)-3-phenyl-1-tosylindoline-2,2-dicarboxylate **3a** (14.8 mg, 0.03 mmol) is dissolved in dry THF (0.5 mL). The solution is cooled down to 0 ºC and $LiAlH_4$ (1 mL, 0.2 mmol) is added dropwise and then, stirred at r.t. for 16 hours. After completion of the reaction, the reaction mixture is quenched with H_2O, extracted with DCM (x3) and dried with anhydrous Na_2SO_4. The residue is purified by flash column chromatography using mixtures of hexane/EtOAc as eluent to obtain **4** as a white solid (11.7 mg, 95% yield). The enantiomeric ratio was found to be 96:4 e.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 80:20 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 11.938 min, tr (minor): 14.997 min. **M.p.:** 141-142 ºC. **R*f* =** 0.43 (Hexane/EtOAc 6:4). $[\alpha]_D^{25}$ **=** -82 (c = 0.1, $CHCl_3$).

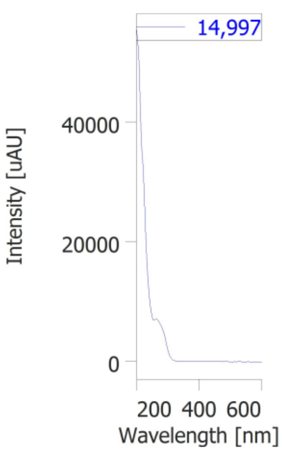
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.83 (d, *J* = 8.4 Hz, 2H), 7.59 (d, *J* = 8.2 Hz, 1H), 7.30 (d, *J* = 8.4 Hz, 2H), 7.25 – 7.15 (m, 3H), 7.14 – 7.05 (m, 2H), 7.05 – 6.93 (m, 3H), 4.58 (s, 1H), 4.23 (d, *J* = 11.7 Hz, 1H), 3.73 (d, *J* = 11.7 Hz, 1H), 3.69 – 3.61 (m, 2H), 3.17 (bs, 1H), 2.67 (bs, 1H), 2.44 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 144.6 (C), 141.9 (C), 138.1 (C), 137.6 (C), 132.9 (C), 130.1 (2 x CH), 129.4 (2 x CH), 128.5 (2 x CH), 128.4 (CH), 127.7 (CH), 127.0 (2 x CH), 126.3 (CH), 124.3 (CH), 114.6 (CH), 79.9 (C), 64.8 (CH_2), 63.4 (CH_2), 53.3 (CH), 21.7 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{23}H_{24}NO_4S$ $[M+H]^+$: 410.1426, found 410.1420.







Peak Information

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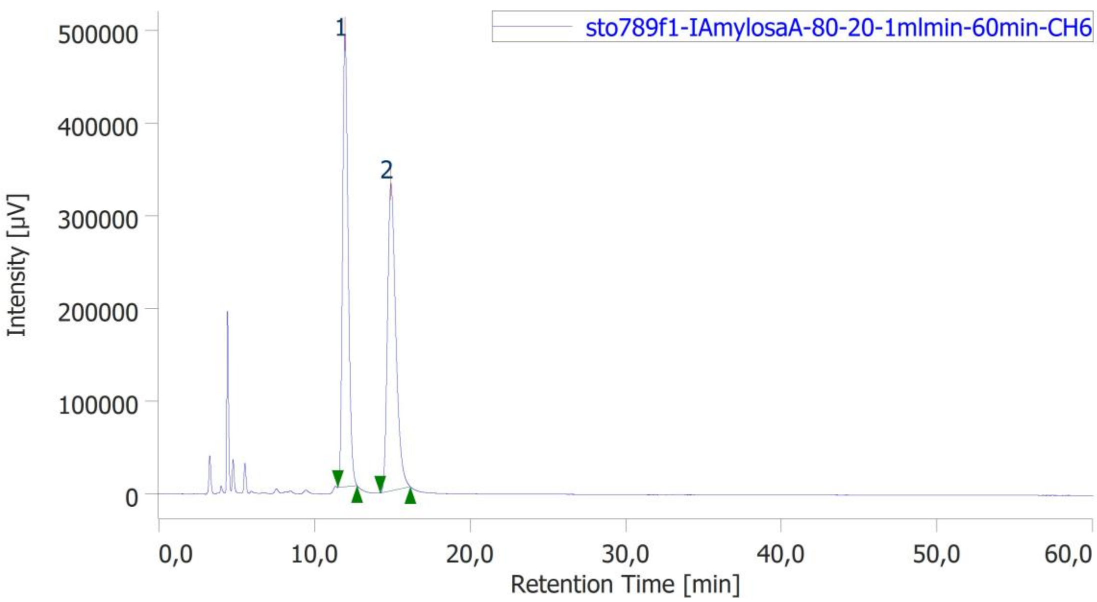
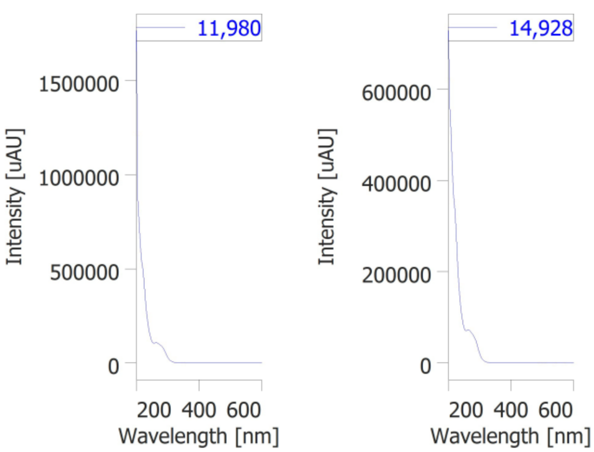
1	Unknown	6	11,938	23727142	933520	95,741	96,872	N/A	5184	3,819	1,321	
2	Unknown	6	14,997	1055415	30139	4,259	3,128	N/A	4048	N/A	1,171	

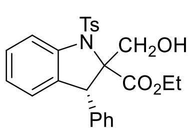




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	11,980	12288003	488299	49,948	59,556	N/A	5263	3,656	1,262	
2	Unknown	6	14,928	12313387	331598	50,052	40,444	N/A	3898	N/A	1,385	

Ethyl (3*R*)-2-(hydroxymethyl)-3-phenyl-1-tosylindoline-2-carboxylate (5)



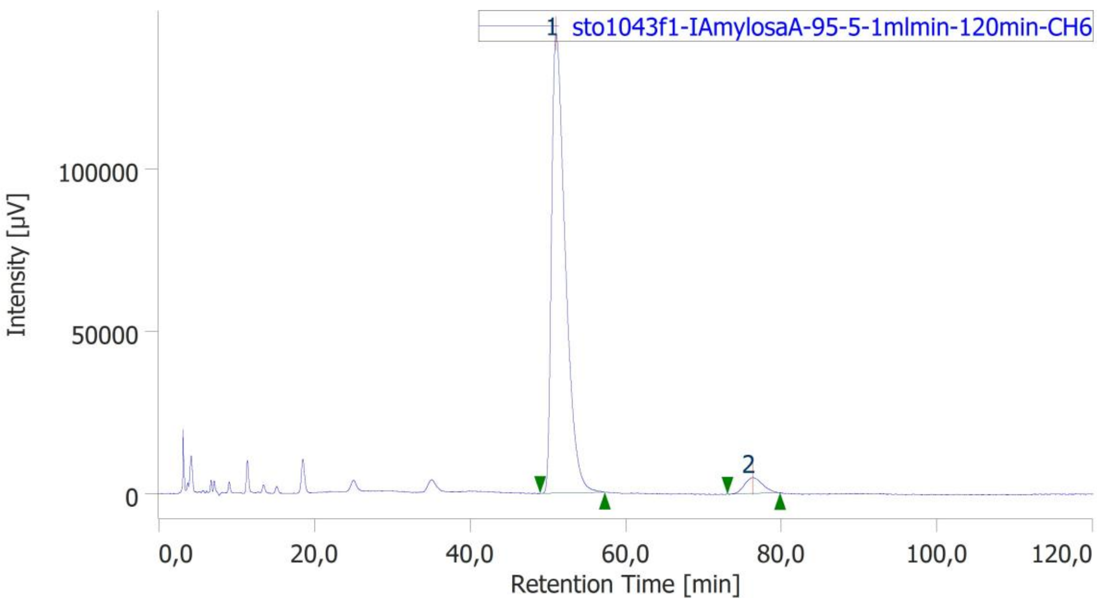
In a Schlenk flask under Ar atmosphere diethyl (*R*)-3-phenyl-1-tosylindoline-2,2-dicarboxylate **3a** (32.0 mg, 0.065 mmol), $NaBH_4$ (2.5 mg, 0.065 mmol) and LiCl (2.8 mg, 0.065 mmol) are dissolved in EtOH (1 mL) and H_2O (1 mL) and, then, stirred at r.t. for 16 hours. After completion of the reaction, the reaction mixture is diluted with Rochelle Salt 10%, extracted with EtOAc (x3) and dried with anhydrous Na_2SO_4. The residue is purified by flash column chromatography using mixtures of hexane/EtOAc as eluent to obtain **5** as a white solid (29.4 mg, 65% yield). The enantiomeric ratio was found to be 96:4 e.r. by analytical

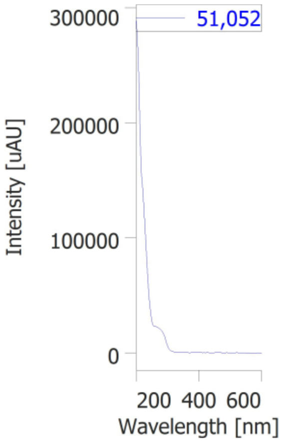
HPLC using a chiral column Reflect I-Amylose A, 95:5 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 51.052 min, tr (minor): 76.297 min. Only major diastereomer is observed. **M.p.:** 127-129 ºC. **R_f =** 0.27 (Hexane/EtOAc 8:2). $[\alpha]_D^{25}$ **=** +108 (c = 0.1, $CHCl_3$).

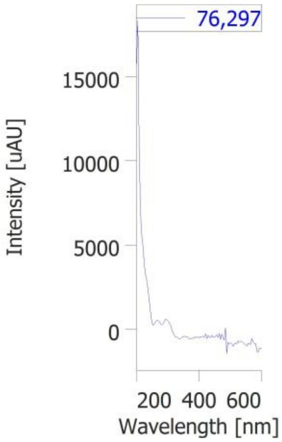
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.99 (d, *J* = 8.4 Hz, 2H), 7.33 (d, *J* = 8.4 Hz, 2H), 7.30 – 7.24 (m, 3H), 7.20 – 7.06 (m, 4H), 7.06 – 6.95 (m, 2H), 5.20 (s, 1H), 4.58 (dd, *J* = 11.7, 5.6 Hz, 1H), 4.03 (dd, *J* = 11.7, 8.9 Hz, 1H), 3.72 (dq, *J* = 10.7, 7.2 Hz, 1H), 3.49 (dq, *J* = 10.7, 7.2 Hz, 1H), 2.92 (dd, *J* = 8.9, 5.6 Hz, 1H), 2.43 (s, 3H), 0.87 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 170.4 (C), 144.5 (C), 142.3 (C), 138.6 (C), 137.6 (C), 130.6 (C), 130.2 (2 x CH), 130.0 (2 x CH), 128.6 (CH), 128.2 (2 x CH), 128.0 (CH), 127.7 (2 x CH), 126.4 (CH), 123.4 (CH), 112.8 (CH), 79.4 (C), 65.5 (CH_2), 61.7 (CH_2), 53.7 (CH), 21.7 (CH_3), 13.5 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{25}H_{26}NO_5S$ $[M+H]^+$: 452.1532, found 452.1571.







Peak Information

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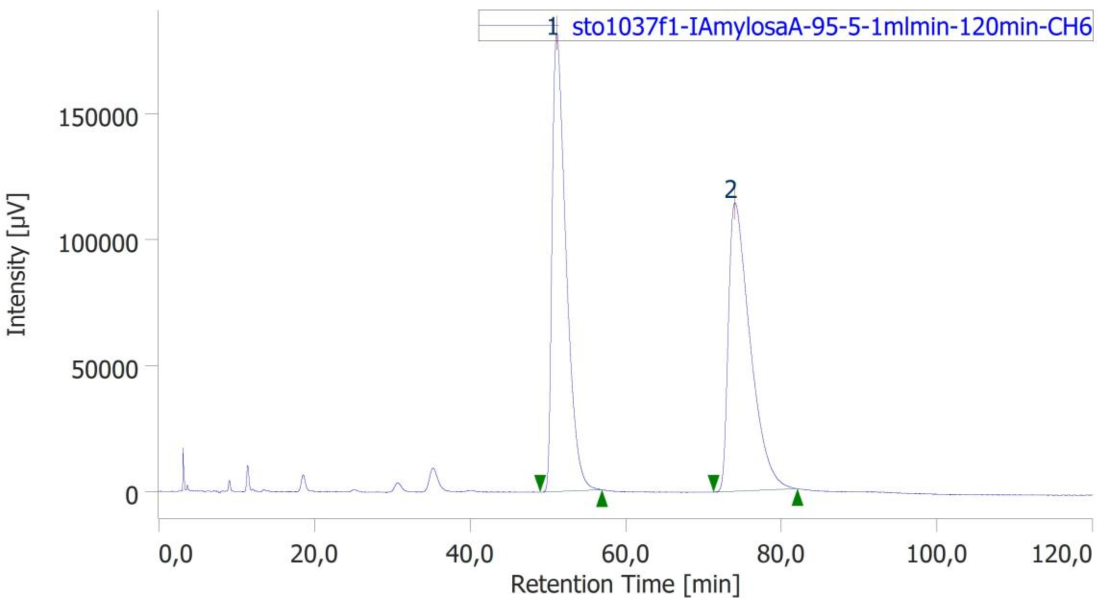
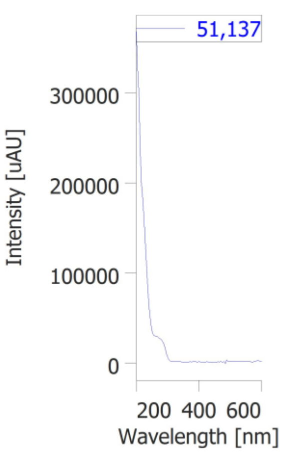
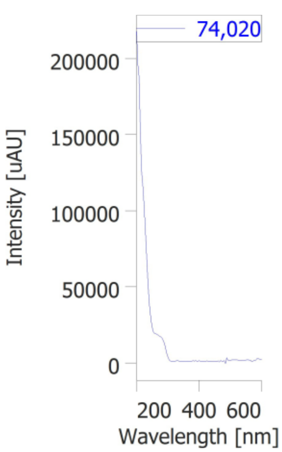
1	Unknown	6	51,052	17349067	141446	95,646	96,682	N/A	4142	6,709	1,840	
2	Unknown	6	76,297	789793	4855	4,354	3,318	N/A	4872	N/A	1,182	



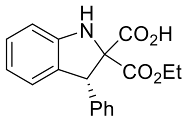




Peak Information

#	Peak Name	CH	tR [min]	Area [µV·sec]	Height [µV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	51,137	22579171	181789	50,445	61,381	N/A	4038	5,578	1,879	
2	Unknown	6	74,020	22180423	114377	49,555	38,619	N/A	3496	N/A	2,079	

(3*R*)-2-(ethoxycarbonyl)-3-phenylindoline-2-carboxylic acid (6)

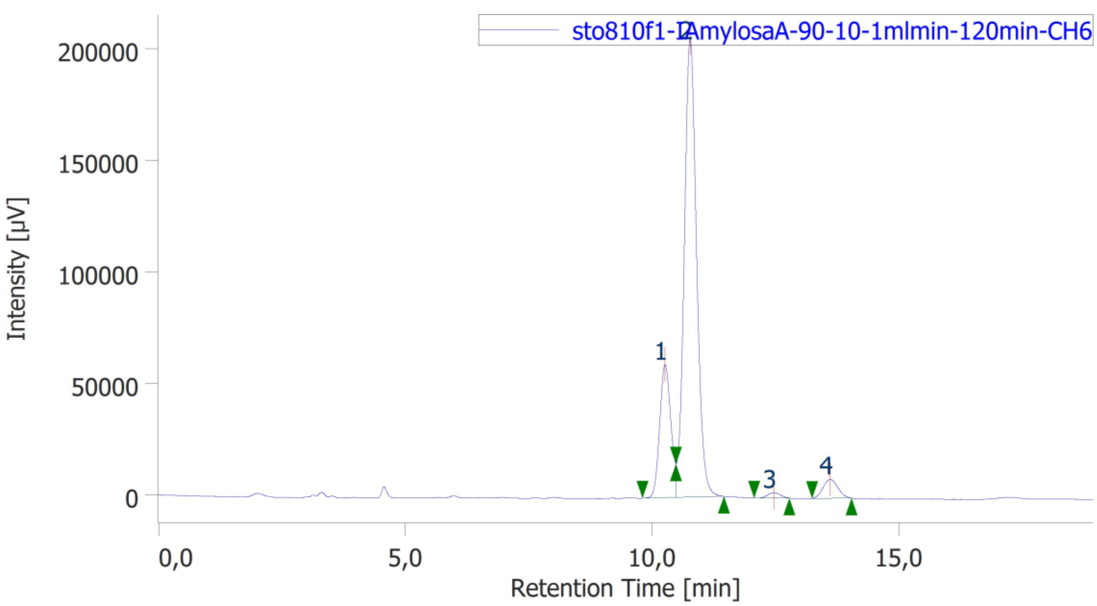


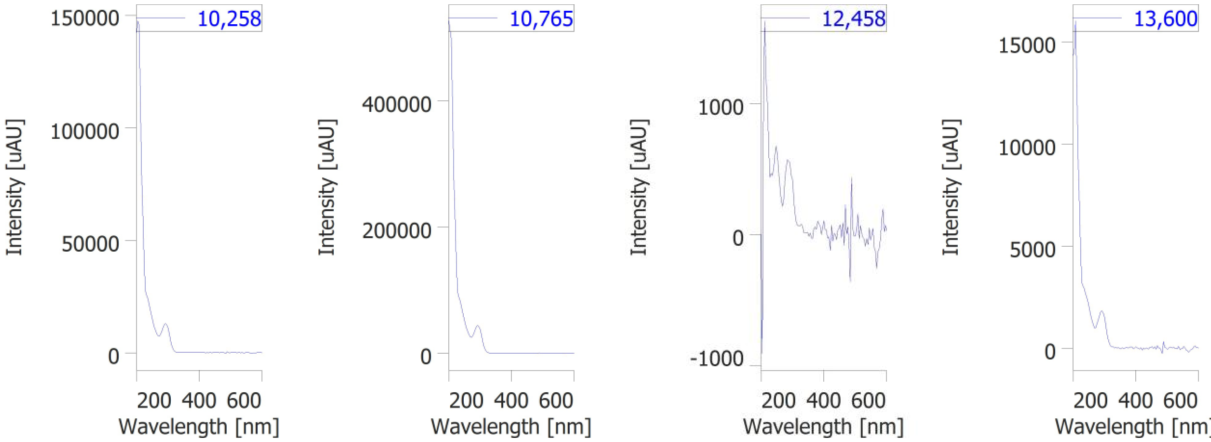
In a Schlenk flask diethyl (*R*)-3-phenyl-1-tosylindoline-2,2-dicarboxylate **3a** (19.5 mg, 0.0395 mmol) and Mg (96.0 mg) are added and dissolved in dry MeOH (1.5 mL), under Ar atmosphere and stirred at 60 ºC for one hour. After completion of the reaction, the reaction mixture is quenched by saturated aqueous solution of ammonia chloride, extracted with EtOAc (x3) and dried with anhydrous Na_2SO_4. The residue is purified by flash column chromatography using mixtures of hexane/EtOAc as eluent to obtain **6** as a white solid (11.0 mg, 82% yield). The enantiomeric ratio was found to be 96:4 e.r. and the diastereomeric ratio was found to be 4:1 d.r. by analytical HPLC using a chiral column Reflect I-Amylose A, 90:10 hexane:*i*PrOH, 1 mL/min, λ= 220 nm, tr (major): 10.258 min, tr (minor): 12.458 min for major diastereomer, tr (major): 10.765 min, tr (minor): 13.600 min for minor diastereomer. **M.p.:** 163-164 ºC. **R_f =** 0.35 (Hexane/EtOAc 8:2). $[\boldsymbol{\alpha}]_D^{25}$ **=** -125 (c = 0.1, $CHCl_3$).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.26 – 7.04 (m, 6H), 6.90 (d, *J* = 7.4 Hz, 1H), 6.82 (d, *J* = 7.9 Hz, 1H), 6.78 (t, *J* = 7.4 Hz, 1H), 5.41 (s, 1H), 4.92 (s, 1H), 3.79 – 3.71 (m, 1H), 3.49 (dq, J = 10.7, 7.2 Hz, 1H), 0.77 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 170.5 (C), 169.1 (C), 148.6 (C), 139.5 (C), 130.2 (C), 129.7 (2 x CH), 128.5 (CH), 128.3 (2 x CH), 127.6 (CH), 125.4 (CH), 120.6 (CH), 110.6 (CH), 78.8 (C), 62.1 (CH_2), 54.4 (CH), 13.5 (CH_3).

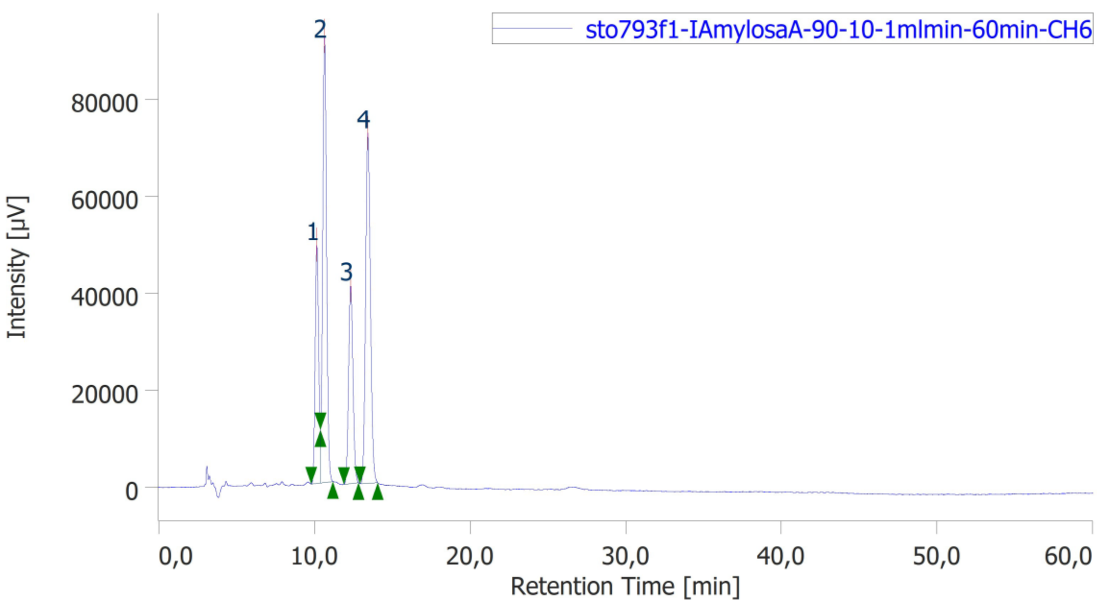
HRMS (ESI-TOF): m/z calculated for $C_{18}H_{18}NO_4$ $[M+H]^+$: 312.1236, found 312.1232.

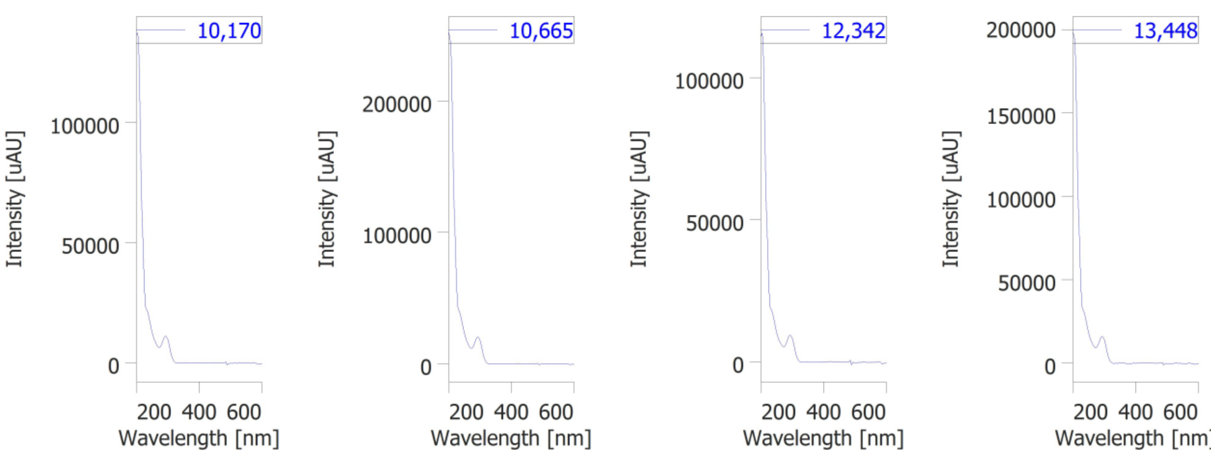




Peak Information

#	Peak Name	CH	tR [min]	Area [μV·sec]	Height [μV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	10,258	937135	59726	19,817	21,606	N/A	9313	1,162	N/A	
2	Unknown	6	10,765	3571627	205799	75,528	74,448	N/A	9176	3,622	N/A	
3	Unknown	6	12,458	43720	2442	0,925	0,883	N/A	10431	2,185	1,038	
4	Unknown	6	13,600	176405	8467	3,730	3,063	N/A	9434	N/A	1,089	



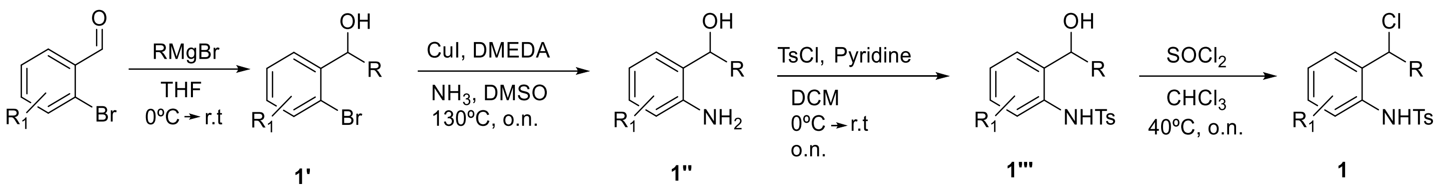


Peak Information

#	Peak Name	CH	tR [min]	Area [μV·sec]	Height [μV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor	Warning
1	Unknown	6	10,170	767036	49112	16,341	19,338	N/A	9262	1,138	N/A	
2	Unknown	6	10,665	1585254	91928	33,772	36,196	N/A	9015	3,510	N/A	
3	Unknown	6	12,342	787628	40803	16,780	16,066	N/A	9419	2,063	1,103	
4	Unknown	6	13,448	1554042	72127	33,107	28,400	N/A	8996	N/A	1,120	

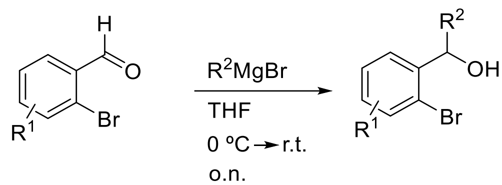
4. Synthesis of aza-*o*-quinone methide precursors

4.1 . Route 1



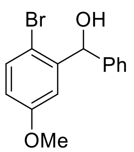
4.1.1. Synthesis of bromo benzyl alcohols (1')

General procedure



2-bromobenzaldehyde (1.0 equiv.) is added to a Schlenk flask and dissolved in dry THF (0.1 M), under Ar atmosphere. The reaction is cooled down to 0 ºC and Grignard reagent (1.0 equiv.) is added, dropwise. The solution is stirred until completion of the reaction at room temperature. Then, the mixture is quenched with saturated NH_4Cl, extracted with DCM (x3) and dried over anhydrous Na_2SO_4. The crude is purified by column chromatography (hexane/EtOAc) affording 2-bromobenzylalcohols (**1'**).

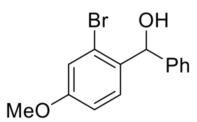
(2-bromo-5-methoxyphenyl)(phenyl)methanol (1b')[1]



General procedure was followed to obtain **1b'** as a yellow oil (0.43 g, >99% yield).

^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 7.46 – 7.25 (m, 6H), 7.19 (d, *J* = 3.1 Hz, 1H), 6.71 (dd, *J* = 8.7, 3.1 Hz, 1H), 6.10 (d, *J* = 3.7 Hz, 1H), 3.77 (s, 3H), 2.82 (d, *J* = 3.7 Hz, 1H).

(2-bromo-4-methoxyphenyl)(phenyl)methanol (1c')



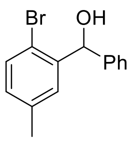
General procedure was followed to obtain **1c'** as a yellow oil (1.16 g, 85% yield). **R_f =** 0.23 (Hexane/EtOAc 10:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.43 – 7.37 (m, 3H), 7.34 (tt, *J* = 6.5, 1.0 Hz, 2H), 7.30 – 7.24 (m, 1H), 7.10 (d, *J* = 2.6 Hz, 1H), 6.87 (dd, *J* = 8.7, 2.6 Hz, 1H), 6.16 (d, *J* = 3.7 Hz, 1H), 3.79 (s, 3H), 2.33 (d, *J* = 3.7 Hz, 1H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 159.6 (C), 142.7 (C), 134.9 (C), 129.3 (CH), 128.6 (2 x CH), 127.7 (CH), 126.9 (2 x CH), 123.3 (C), 118.0 (CH), 114.0 (CH), 74.5 (CH), 55.7 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{14}H_{12}BrO$ $[M-H_2O+H]^+$: 275.0072, found 275.0066.

(2-bromo-5-methylphenyl)(phenyl)methanol (1d')



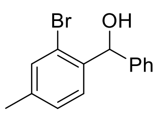
General procedure was followed to obtain **1d'** as a yellow oil (0.69 g, >99% yield). **R_f =** 0.27 (Hexane/EtOAc 10:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.45 – 7.38 (m, 4H), 7.34 (t, *J* = 7.4 Hz, 2H), 7.29 (d, *J* = 7.4 Hz, 1H), 6.96 (dd, *J* = 8.1, 2.3 Hz, 1H), 6.18 (d, *J* = 3.9 Hz, 1H), 2.45 – 2.26 (m, 1H), 2.31 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 142.4 (C), 142.2 (C), 137.9 (C), 132.7 (CH), 130.1 (CH), 129.2 (CH), 128.6 (2 x CH), 127.9 (CH), 127.1 (2 x CH), 119.6 (C), 74.9 (CH), 21.2 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{14}H_{12}Br$ $[M-H_2O+H]^+$: 259.0122, found 259.0114.

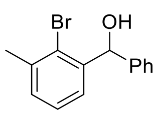
(2-bromo-4-methylphenyl)(phenyl)methanol (1e)[2]



General procedure was followed to obtain **1e'** as a yellow oil (0.72 g, 97% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.48 – 7.22 (m, 7H), 7.14 (d, *J* = 7.9 Hz, 1H), 6.17 (d, *J* = 3.8 Hz, 1H), 2.35 (d, *J* = 3.8 Hz, 1H), 2.32 (s, 3H).

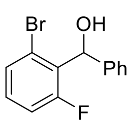
(2-bromo-3-methylphenyl)(phenyl)methanol (1f')[3]



General procedure was followed to obtain **1f'** as a yellow oil (0.57 g, 82% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.47 – 7.14 (m, 8H), 6.25 (s, 1H), 2.72 (bs, 1H), 2.43 (s, 3H).

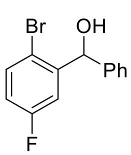
(2-bromo-6-fluorophenyl)(phenyl)methanol (1g')[4]



General procedure was followed to obtain **1g'** as a yellow oil (0.56 g, 81% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.47 – 7.27 (m, 6H), 7.18 (td, *J* = 8.2, 5.9 Hz, 1H), 7.06 (ddd, *J* = 10.7, 8.2, 1.3 Hz, 1H), 6.40 (d, *J* = 9.8 Hz, 1H), 2.96 (dd, *J* = 9.8, 4.9 Hz, 1H).

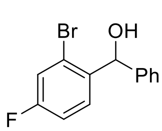
(2-bromo-5-fluorophenyl)(phenyl)methanol (1h')[5]



General procedure was followed to obtain **1h'** as a yellow oil (0.97 g, 80% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.48 (dd, *J* = 8.8, 5.2 Hz, 1H), 7.43 – 7.29 (m, 6H), 6.89 (ddd, *J* = 8.8, 7.7, 3.1 Hz, 1H), 6.12 (d, *J* = 3.5 Hz, 1H), 2.35 (d, *J* = 3.5 Hz, 1H).

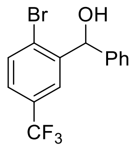
(2-bromo-4-fluorophenyl)(phenyl)methanol (1i')[5]



General procedure was followed to obtain **1i'** as a yellow oil (0.82 g, 87% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.57 (dd, *J* = 8.3, 6.1 Hz, 1H), 7.44 – 7.20 (m, 6H), 7.07 (td, *J* = 8.3, 2.6 Hz, 1H), 6.16 (d, *J* = 3.7 Hz, 1H), 2.37 (d, *J* = 3.7 Hz, 1H).

(2-bromo-5-(trifluoromethyl)phenyl)(phenyl)methanol (1m')



General procedure was followed to obtain **1m'** as a white solid (0.84 g, 32%). **M.p.:** 113-115 ºC. **R_f =** 0.22 (Hexane/EtOAc 10:1).

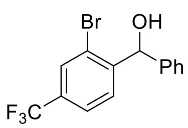
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.01 (d, *J* = 2.3 Hz, 1H), 7.66 (dd, *J* = 8.4, 1.0 Hz, 1H), 7.45 – 7.23 (m, 6H), 6.17 (d, *J* = 3.6 Hz, 1H), 2.44 (d, *J* = 3.6 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 143.7 (C), 141.4 (C), 133.6 (CH), 130.2 (q, $^2J_{C-F}$ = 32.8 Hz, C), 128.9 (2 x CH), 128.4 (CH), 127.4 (2 x CH), 126.8 (q, $^1J_{C-F}$ = 273.1 Hz, C), 126.43 (q, $^5J_{C-F}$ = 1.6 Hz, C), 125.8 (q, $^3J_{C-F}$ = 3.7 Hz, CH), 125.3 (q, $^3J_{C-F}$ = 3.8 Hz, CH), 74.8 (CH).

^{19}F NMR (376 MHz, $CDCl_3$): δ (ppm) **-**62.63.

HRMS (ESI-TOF): m/z calculated for $C_{14}H_9BrF_3$ $[M-H_2O+H]^+$: 312.9840, found 312.9873.

(2-bromo-4-(trifluoromethyl)phenyl)(phenyl)methanol (1n')



General procedure was followed to obtain **1n'** as a yellow oil (1.55 g, 79% yield). **R_f =** 0.26 (Hexane/EtOAc 10:1).

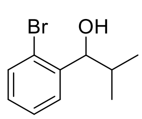
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.84 – 7.75 (m, 2H), 7.62 (d, *J* = 8.8 Hz, 1H), 7.42 – 7.27 (m, 5H), 6.17 (d, *J* = 3.4 Hz, 1H), 2.57 (d, *J* = 3.4 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 146.5 (C), 141.4 (C), 131.34 (q, $^2J_{C-F}$ = 33.1 Hz, C), 130.00 (q, $^3J_{C-F}$ = 3.8 Hz, CH), 128.8 (2 x CH), 128.8 (CH), 128.4 (CH), 127.3 (2 x CH), 124.7 (q, $^3J_{C-F}$ = 3.9 Hz, CH), 122.8 (C), 121.9 (d, $^1J_{C-F}$ = 272.0 Hz, C), 74.7 (CH).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -62.7.

HRMS (ESI-TOF): m/z calculated for $C_{14}H_9BrF_3$ $[M-H_2O+H]^+$: 312.9840, found 312.9834.

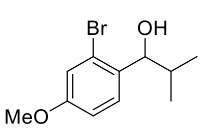
1-(2-bromophenyl)-2-methylpropan-1-ol (1q')[6]



General procedure was followed to obtain **1q** as a yellow oil (1.02 g, 82% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.50 (dd, *J* = 8.2, 1.3 Hz, 1H), 7.46 (dd, *J* = 8.2, 1.8 Hz, 1H), 7.30 (td, *J* = 7.6, 1.3 Hz, 1H), 7.09 (td, *J* = 7.6, 1.8 Hz, 1H), 4.84 (d, *J* = 5.8 Hz, 1H), 2.48 (bs, 1H), 2.19 – 1.81 (m, 1H), 1.06 – 0.78 (m, 6H).

1-(2-bromo-4-methoxyphenyl)-2-methylpropan-1-ol (`1r')



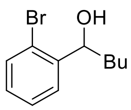
General procedure was followed to obtain **1r'** as a yellow oil (0.90 g, 75% yield). **R_f =** 0.25 (Hexane/EtOAc 10:1).

^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.38 (d, *J* = 8.6 Hz, 1H), 7.07 (d, *J* = 2.6 Hz, 1H), 6.89 (dd, *J* = 8.6, 2.6 Hz, 1H), 4.79 (dd, *J* = 6.7, 3.6 Hz, 1H), 3.79 (s, 3H), 2.08 – 1.95 (m, 1H), 1.83 (d, *J* = 3.6 Hz, 1H), 0.99 (d, *J* = 6.7 Hz, 3H), 0.90 (d, *J* = 6.7 Hz, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 159.2 (C), 135.1 (C), 128.8 (CH), 123.1 (C), 117.7 (CH), 113.9 (CH), 77.5 (CH), 55.7 (CH$_3$), 34.5 (CH), 19.5 (CH$_3$), 17.4 (CH$_3$).

HRMS (ESI-TOF): m/z calculated for $C_{11}H_{14}BrO$ [M-H_2O+H]$^+$: 241.0228, found 241.0222.

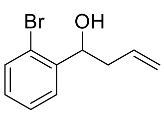
1-(2-bromophenyl)pentan-1-ol (1s')[7]



General procedure was followed to obtain **1s'** as a yellow oil (1.00 g, 76% yield).

^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 7.58 – 7.46 (m, 2H), 7.33 (td, *J* = 7.6, 1.3 Hz, 1H), 7.11 (td, *J* = 7.6, 1.8 Hz, 1H), 5.06 (dt, *J* = 8.0, 3.3 Hz, 1H), 2.13 (d, *J* = 3.3 Hz, 1H), 1.92 – 1.57 (m, 2H), 1.57 – 1.22 (m, 4H), 0.91 (t, *J* = 7.0 Hz, 3H).

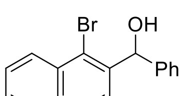
1-(2-bromophenyl)but-3-en-1-ol (1t')[8]



General procedure was followed to obtain **1t'** as a yellow oil (0.96 g, 78% yield).

^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 7.55 (d, *J* = 7.9 Hz, 1H), 7.51 (d, *J* = 8.2 Hz, 1H), 7.33 (t, *J* = 7.9 Hz, 1H), 7.12 (t, *J* = 8.2 Hz, 1H), 5.88 (ddt, *J* = 14.3, 10.4, 7.1 Hz, 1H), 5.27 – 5.13 (m, 2H), 5.10 (dt, *J* = 7.7, 3.5 Hz, 1H), 2.71 – 2.52 (m, 1H), 2.46 – 2.26 (m, 2H).

(1-bromonaphthalen-2-yl)(phenyl)methanol (1u')



General procedure was followed to obtain **1u'** as a yellow oil (0.28 g, >99% yield). **R_f =** 0.31 (Hexane/EtOAc 10:1).

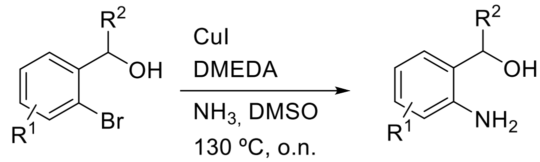
^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 8.34 (d, *J* = 8.5 Hz, 1H), 7.90 – 7.74 (m, 2H), 7.70 (d, *J* = 8.5 Hz, 1H), 7.60 (ddd, *J* = 8.1, 6.9, 1.3 Hz, 1H), 7.53 (ddd, *J* = 8.1, 6.9, 1.3 Hz, 1H), 7.47 (d, *J* = 7.4 Hz, 2H), 7.38 – 7.31 (m, 2H), 7.30 – 7.26 (m, 1H), 6.60 (d, *J* = 3.7 Hz, 1H), 2.45 (d, *J* = 3.7 Hz, 1H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 142.6 (C), 140.7 (C), 134.3 (C), 132.3 (C), 128.6 (2 x CH), 128.3 (CH), 128.3 (CH), 127.8 (CH), 127.7 (CH), 127.7 (CH), 126.9 (3 x CH), 125.4 (CH), 122.9 (C), 75.4 (CH).

HRMS (ESI-TOF): m/z calculated for $C_{17}H_{12}Br$ [M-H_2O+H]$^+$: 295.0122, found 295.0129.

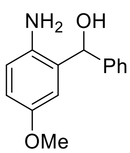
4.1.2. Synthesis of amino benzyl alcohols (1'')

General procedure



2-bromobenzylalcohol (**1'**, 1.0 equiv.), CuI (0.1 equivalents), DMEDA (1.5 equivalents), DMSO (2.5 mL) and NH_3 are added to a Schlenk flask until the vessel is filled (>25 equivalents). The solution is heated to 130 °C and stirred overnight. The resulting solution is cooled down to room temperature, extracted with EtOAc (x3) and dried over anhydrous Na_2SO_4. The residue is purified by flash column chromatography using hexane/EtOAc as eluent to afford the corresponding products (**1''**).

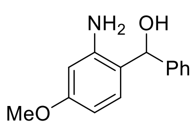
(2-amino-5-methoxyphenyl)(phenyl)methanol (1b'')[9]



General procedure was followed to obtain **1b''** as a white solid (0.52 g, 95% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.45 – 7.28 (m, 5H), 6.73 (s, 1H), 6.72 (d, *J* = 7.5 Hz, 1H), 6.64 (d, *J* = 7.5 Hz, 1H), 5.83 (s, 1H), 3.73 (s, 3H), 3.55 (bs, 2H), 2.88 (bs, 1H).

(2-amino-4-methoxyphenyl)(phenyl)methanol (1c'')



General procedure was followed to obtain **1c''** as a white solid (0.27 g, 69% yield). **M.p.:** 120-122 ºC. **R_f =** 0.56 (Hexane/EtOAc 6:4).

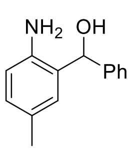
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.49 – 7.28 (m, 5H), 6.88 (d, *J* = 8.3 Hz, 1H), 6.28 (dd, *J* = 8.3, 2.5 Hz, 1H), 6.23 (d, *J* = 2.5 Hz, 1H), 5.84 (s, 1H), 4.04 (bs, 2H), 3.76 (s, 3H), 2.40 (bs, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 160.6 (C), 146.5 (C), 142.3 (C), 130.1 (CH), 128.6 (2 x CH), 127.7 (CH), 126.6 (2 x CH), 120.5 (C), 103.4 (CH), 102.6 (CH), 74.8 (CH), 55.3 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{14}H_{14}NO$ $[M-H_2O+H]^+$: 212.1075, found 212.1077.

HRMS (ESI-TOF): m/z calculated for $C_{14}H_{12}NO_2$ $[M-H_2O+H]^+$: 226.0868, found 226.0863.

(2-amino-5-methylphenyl)(phenyl)methanol (1d'')



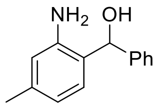
General procedure was followed to obtain **1d''** as a white solid (0.31 g, 81% yield). **M.p.:** 111-113 ºC. **R_f =** 0.63 (Hexane/EtOAc 6:4).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.43 – 7.33 (m, 4H), 7.33 – 7.27 (m, 1H), 6.94 (dd, *J* = 7.9, 1.6 Hz, 1H), 6.90 (s, 1H), 6.60 (d, *J* = 7.9 Hz, 1H), 5.82 (s, 1H), 3.76 (bs, 2H), 2.71 (bs, 1H), 2.24 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 142.2 (C), 142.2 (C), 129.5 (CH), 129.3 (CH), 128.6 (2 x CH), 128.0 (C), 128.0 (C), 127.7 (CH), 126.7 (2 x CH), 117.5 (CH), 75.1 (CH), 20.7 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{14}H_{14}NO$ $[M-H_2O+H]^+$: 196.1126, found 196.1118.

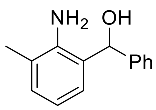
(2-amino-4-methylphenyl)(phenyl)methanol (1e'')[9]



General procedure was followed to obtain **1e''** as a white solid (0.61 g, 65% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.48 – 7.11 (m, 5H), 6.82 (dd, *J* = 7.3, 3.8 Hz, 1H), 6.52 – 6.39 (m, 2H), 5.77 (d, *J* = 3.7 Hz, 1H), 4.01 (bs, 2H), 2.79 (d, *J* = 3.7 Hz, 1H), 2.56 (s, 3H).

(2-amino-3-methylphenyl)(phenyl)methanol (1f``)



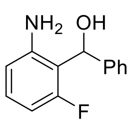
General procedure was followed to obtain **1f''** as a white solid (0.12 g, 54% yield). **M.p.:** 114-116 ºC. **R$_f$ =** 0.61 (Hexane/EtOAc 6:4).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.46 – 7.34 (m, 4H), 7.32 – 7.27 (m, 1H), 7.05 (d, *J* = 7.5 Hz, 1H), 6.92 (d, *J* = 7.5 Hz, 1H), 6.67 (t, *J* = 7.5 Hz, 1H), 5.90 (d, *J* = 3.6 Hz, 1H), 4.01 (bs, 2H), 2.46 (d, *J* = 3.6 Hz, 1H), 2.16 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 142.2 (C), 142.2 (C), 129.5 (CH), 129.3 (CH), 128.6 (2 x CH), 128.0 (C), 128.0 (C), 127.7 (CH), 126.7 (2 x CH), 117.5 (CH), 75.1 (CH), 20.7 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{14}H_{14}N$ $[M-H_2O+H]^+$: 196.1126, found 196.1118.

(2-amino-6-fluorophenyl)(phenyl)methanol (1g'')



General procedure was followed to obtain **1g''** as a white solid (0.25 g, 73% yield). **M.p.:** 128-130 ºC. **R$_f$ =** 0.68 (Hexane/EtOAc 6:4).

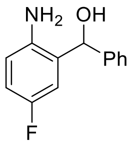
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.46 – 7.41 (m, 2H), 7.37 – 7.31 (m, 2H), 7.29 – 7.24 (m, 1H), 7.08 – 7.00 (m, 1H), 6.53 – 6.45 (m, 1H), 6.42 – 6.37 (m, 2H), 4.22 (bs, 2H), 2.81 (bs, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 161.2 (d, $^{1}J_{C-F}$ = 242.6 Hz, C), 147.1 (d, $^{3}J_{C-F}$ = 5.7 Hz, C), 141.6 (C), 129.7 (d, $^{3}J_{C-F}$ = 11.0 Hz, CH), 128.5 (2 x CH), 127.5 (CH), 125.8 (2 x CH), 114.7 (d, $^{2}J_{C-F}$ = 15.3 Hz, C), 113.0 (d, $^{4}J_{C-F}$ = 2.9 Hz, CH), 104.9 (d, $^{2}J_{C-F}$ = 23.9 Hz, CH), 68.1 (d, $^{3}J_{C-F}$ = 7.6 Hz, CH).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -119.8.

HRMS (ESI-TOF): m/z calculated for $C_{13}H_{11}FN$ $[M-H_2O+H]^+$: 200.0876, found 200.0868.

(2-amino-5-fluorophenyl)(phenyl)methanol (1h'')



General procedure was followed to obtain **1h''** as a white solid (0.55 g, 73% yield). **M.p.:** 122-123 ºC. **R_f =** 0.74 (Hexane/EtOAc 6:4).

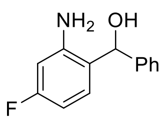
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.42 – 7.29 (m, 5H), 6.89 – 6.79 (m, 2H), 6.62 (dd, J = 9.4, 4.8 Hz, 1H), 5.82 (s, 1H), 3.76 (bs, 2H), 2.58 (bs, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 156.4 (d, $^{1}J_{C-F}$ = 236.4 Hz, C), 141.5 (C), 140.7 (d, $^{4}J_{C-F}$ = 2.2 Hz, C), 129.4 (d, $^{3}J_{C-F}$ = 6.1 Hz, C), 128.9 (2 x CH), 128.2 (CH), 126.9 (2 x CH), 118.0 (d, $^{3}J_{C-F}$ = 7.5 Hz, CH), 115.3 (d, $^{2}J_{C-F}$ = 18.7 Hz, CH), 115.1 (d, $^{2}J_{C-F}$ = 19.8 Hz, CH), 74.3 (CH).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -114.2.

HRMS (ESI-TOF): m/z calculated for $C_{13}H_{11}FN$ $[M-H_2O+H]^+$: 200.0876, found 200.0869.

(2-amino-4-fluorophenyl)(phenyl)methanol (1i'')



General procedure was followed to obtain **1i''** as a white solid (0.21 g, 57% yield). **M.p.:** 124-125 ºC. **R_f =** 0.72 (Hexane/EtOAc 6:4).

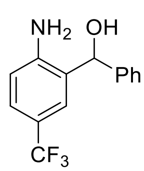
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.44 – 7.28 (m, 5H), 6.92 (dd, J = 8.4, 6.4 Hz, 1H), 6.41 (dd, J = 8.4, 2.5 Hz, 1H), 6.37 (dd, J = 10.2, 2.5 Hz, 1H), 5.83 (s, 1H), 4.15 (bs, 2H), 2.43 (bs, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 163.6 (d, $^{1}J_{C-F}$ = 244.2 Hz, C), 146.9 (d, $^{3}J_{C-F}$ = 10.9 Hz, C), 141.8 (C), 130.3 (d, $^{3}J_{C-F}$ = 10.1 Hz, CH), 128.7 (2 x CH), 127.9 (CH), 126.6 (2 x CH), 123.2 (d, $^{4}J_{C-F}$ = 2.6 Hz, C), 104.6 (d, $^{2}J_{C-F}$ = 21.4 Hz, CH), 103.4 (d, $^{2}J_{C-F}$ = 24.5 Hz, CH), 74.7 (CH).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -114.2.

HRMS (ESI-TOF): m/z calculated for $C_{13}H_{11}FN$ $[M-H_2O+H]^+$: 200.0876, found 200.0868.

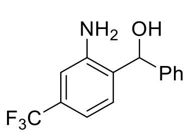
(2-amino-5-(trifluoromethyl)phenyl)(phenyl)methanol (1m')[9]



General procedure was followed to obtain **1m'** as a white solid (0.225 g, 43%).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.41 – 7.33 (m, 7H), 6.71 – 6.64 (m, 1H), 5.86 (s, 1H), 4.31 (s, 2H), 2.44 (s, 1H).

(2-amino-4-(trifluoromethyl)phenyl)(phenyl)methanol (1n'')



General procedure was followed to obtain **1n''** as a white solid (0.30 g, 79% yield). **M.p.:** 131-133 ºC. **R_f =** 0.69 (Hexane/EtOAc 6:4).

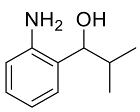
^{1}**H NMR (400 MHz, CDCl$_3$)** δ (ppm) 7.45 – 7.27 (m, 5H), 7.16 (d, *J* = 7.5 Hz, 1H), 6.98 (d, *J* = 7.5 Hz, 1H), 6.88 (s, 1H), 5.87 (s, 1H), 4.17 (bs, 2H), 2.51 (bs, 1H).

^{13}**C NMR (101 MHz, CDCl$_3$)** δ (ppm) 156.0 (C), 145.3 (C), 141.1 (C), 130.4 (C), 129.0 (CH), 128.9 (2 x CH), 128.3 (CH), 127.2 (q, $^{1}J_{C\text{-}F}$ = 272.2 Hz, C), 126.7 (2 x CH), 114.8 (q, $^{3}J_{C\text{-}F}$ = 3.8 Hz, CH), 113.3 (q, $^{3}J_{C\text{-}F}$ = 3.8 Hz, CH), 74.8 (CH).

^{19}**F NMR (376 MHz, CDCl$_3$)** δ (ppm) -62.8.

HRMS (ESI-TOF): m/z calculated for $C_{14}H_{11}F_3N$ [M-H_2O+H]$^+$: 250.0844, found 250.0837.

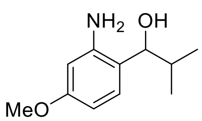
1-(2-aminophenyl)-2-methylpropan-1-ol (1q'')[10]



General procedure was followed to obtain **1q''** as a white solid (0.14 g, 87% yield).

^{1}**H NMR (300 MHz, CDCl$_3$)** δ (ppm) 7.07 (t, *J* = 7.4 Hz, 1H), 7.01 (d, *J* = 7.4 Hz, 1H), 6.76 – 6.54 (m, 2H), 4.28 (d, *J* = 8.6 Hz, 1H), 4.21 (bs, 2H), 2.47 – 2.11 (m, 1H), 2.00 (bs, 1H), 1.11 (d, *J* = 6.6 Hz, 3H), 0.77 (d, *J* = 6.8 Hz, 3H).

1-(2-amino-4-methoxyphenyl)-2-methylpropan-1-ol (1r'')



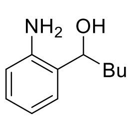
General procedure was followed to obtain **1r''** as a yellow solid (0.13 g, 61% yield). **M.p.:** 115-116 ºC. **R$_f$ =** 0.59 (Hexane/EtOAc 6:4).

^{1}**H NMR (400 MHz, CDCl$_3$)** δ (ppm) 6.90 (d, *J* = 8.3 Hz, 1H), 6.25 (dd, *J* = 8.3, 2.5 Hz, 1H), 6.20 (d, *J* = 2.5 Hz, 1H), 4.29 – 4.16 (m, 3H), 3.75 (s, 3H), 2.32 – 2.23 (m, 1H), 1.90 (bs, 1H), 1.10 (d, *J* = 6.6 Hz, 3H), 0.76 (d, *J* = 6.6 Hz, 3H).

^{13}**C NMR (101 MHz, CDCl$_3$)** δ (ppm) 160.1 (C), 146.5 (C), 130.1 (CH), 119.8 (C), 103.1 (CH), 102.4 (CH), 81.1 (CH), 55.3 (CH_3), 32.0 (CH), 20.1 (CH_3), 19.5 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{11}H_{16}NO$ [M-H_2O+H]$^+$: 178.1232, found 178.1224.

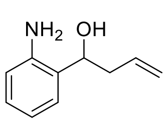
1-(2-aminophenyl)pentan-1-ol (1s'')[11]



General procedure was followed to obtain **1s''** as a white solid (0.33 g, 92% yield).

^{1}**H NMR (300 MHz, CDCl$_3$)** δ (ppm) 7.15 – 6.97 (m, 2H), 6.78 – 6.55 (m, 2H), 4.69 (t, *J* = 6.7 Hz, 1H), 4.23 (bs, 2H), 1.98 – 1.79 (m, 3H), 1.53 – 1.14 (m, 4H), 0.91 (t, *J* = 7.0 Hz, 3H).

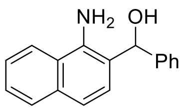
1-(2-aminophenyl)but-3-en-1-ol (1t'')[12]



General procedure was followed to obtain **1t''** as a white solid (0.23 g, 86% yield).

^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 7.16 – 6.99 (m, 2H), 6.72 (td, *J* = 7.9, 1.2 Hz, 1H), 6.66 (dd, *J* = 7.9, 1.2 Hz, 1H), 6.01 – 5.73 (m, 1H), 5.29 – 5.09 (m, 2H), 4.73 (dd, *J* = 8.6, 5.2 Hz, 1H), 4.21 (bs, 2H), 2.83 – 2.46 (m, 2H), 2.32 (bs, 1H).

(1-aminonaphthalen-2-yl)(phenyl)methanol (1u”)



General procedure was followed to obtain **1u”** as a yellow solid (0.59 g, 74% yield). **M.p.:** 121-122 ºC. **R$_f$ =** 0.65 (Hexane/EtOAc 6:4).

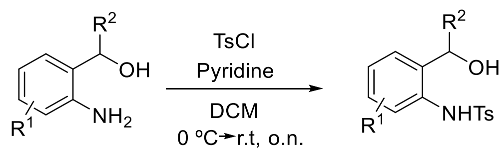
^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.82 – 7.75 (m, 2H), 7.52 – 7.39 (m, 4H), 7.35 (t, *J* = 7.3 Hz, 2H), 7.32 – 7.24 (m, 2H), 7.19 (d, *J* = 8.5 Hz, 1H), 6.05 (s, 1H), 4.62 (bs, 2H), 2.72 (bs, 1H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 142.2 (C), 140.5 (C), 134.1 (C), 128.6 (3 x CH), 127.7 (CH), 126.9 (CH), 126.6 (2 x CH), 126.1 (CH), 125.2 (CH), 124.2 (C), 121.2 (C), 120.6 (CH), 118.1 (CH), 75.6 (CH).

HRMS (ESI-TOF): m/z calculated for $C_{17}H_{14}N$ [M-H_2O+H]$^+$: 232.1126, found 232.1119.

4.1.3. Synthesis of *N*-protected amino benzyl alcohols (1’’’)

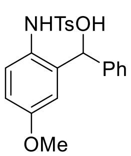
General procedure



2-aminobenzyl alcohol (**1’’**, 1.0 equiv.) in DCM (0.3 M) is added to a Schlenk previously dried and under argon. Next, pyridine (1.1 equivalents) and tosyl chloride (1.05 equivalents) is added at 0 ºC. The resulting mixture is stirred overnight at room temperature until completion of the reaction (monitored by TLC). Next, the mixture is treated with 1 M HCl. The aqueous layer is extracted with DCM (x3), and the combined organic layers are washed with brine and dried over anhydrous Na_2SO_4. The residue was purified by flash chromatography using hexane/EtOAc as eluent to afford the corresponding products (**1’’’**).

***N*-(2-(hydroxy(phenyl)methyl)-4-methoxyphenyl)-4-methylbenzenesulfonamide (1b’’’)**[13]

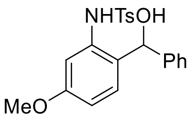
General procedure A was followed to obtain **1b’’’** as a white solid (0.37 g, 82% yield).



^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 7.53 (d, *J* = 8.3 Hz, 2H), 7.38 – 7.26 (m, 3H), 7.24 – 7.02 (m, 6H), 6.73 (dd, *J* = 8.8, 3.0 Hz, 1H), 6.52 (d, *J* = 3.0 Hz, 1H), 5.57 (d, *J* = 3.9 Hz, 1H), 3.69 (s, 3H), 2.57 (d, *J* = 3.9 Hz, 1H), 2.41 (s, 3H).

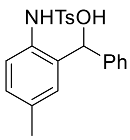
N-(2-(hydroxy(phenyl)methyl)-5-methoxyphenyl)-4-methylbenzenesulfonamide (1c''')[13]

General procedure was followed to obtain **1c'''** as a white solid (0.38 g, 88% yield).



^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 8.07 (bs, 1H), 7.47 (d, *J* = 8.3 Hz, 2H), 7.37 – 7.28 (m, 3H), 7.21 – 7.12 (m, 4H), 7.09 (d, *J* = 2.6 Hz, 1H), 6.78 (d, *J* = 8.5 Hz, 1H), 6.52 (dd, *J* = 8.5, 2.6 Hz, 1H), 5.61 (d, *J* = 3.5 Hz, 1H), 3.74 (s, 3H), 2.46 (d, *J* = 3.5 Hz, 1H), 2.38 (s, 3H).

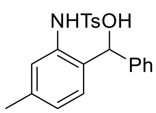
N-(2-(hydroxy(phenyl)methyl)-4-methylphenyl)-4-methylbenzenesulfonamide (1d''')[13]



General procedure was followed to obtain **1d'''** as a white solid (0.14 g, 84% yield).

^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 7.67 (bs, 1H), 7.47 (d, *J* = 8.3 Hz, 2H), 7.34 – 7.24 (m, 4H), 7.21 – 7.11 (m, 4H), 7.01 (d, *J* = 7.9 Hz, 1H), 6.75 (s, 1H), 5.63 (d, *J* = 3.6 Hz, 1H), 2.67 (d, *J* = 3.6 Hz, 1H), 2.38 (s, 3H), 2.21 (s, 3H).

N-(2-(hydroxy(phenyl)methyl)-5-methylphenyl)-4-methylbenzenesulfonamide (1e''')[13]

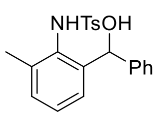


General procedure was followed to obtain **1e'''** as a white solid (0.13 g, 99% yield).

^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 7.91 (bs, 1H), 7.47 (d, *J* = 8.3 Hz, 2H), 7.34 – 7.28 (m, 4H), 7.20 – 7.10 (m, 4H), 6.82 (d, *J* = 7.6 Hz, 1H), 6.77 (d, *J* = 7.6 Hz, 1H), 5.60 (d, *J* = 3.6 Hz, 1H), 2.49 (d, *J* = 3.6 Hz, 1H), 2.38 (s, 3H), 2.28 (s, 3H).

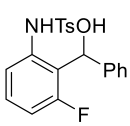
N-(2-(hydroxy(phenyl)methyl)-6-methylphenyl)-4-methylbenzenesulfonamide methanol (1f''')[14]

General procedure was followed to obtain **1f'''** as a white solid (0.20 g, 93% yield).



^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.62 (d, *J* = 8.3 Hz, 2H), 7.37 – 7.22 (m, 5H), 7.19 (d, *J* = 7.4 Hz, 2H), 7.14 – 7.04 (m, 2H), 6.94 (dd, *J* = 7.4, 2.1 Hz, 1H), 6.50 (bs, 1H), 5.90 (d, *J* = 4.0 Hz, 1H), 2.91 (d, *J* = 4.0 Hz, 1H), 2.45 (s, 3H), 1.95 (s, 3H).

N-(3-fluoro-2-(hydroxy(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1g''')



General procedure was followed to obtain **1g'''** as a white solid (0.29 g, 94% yield). **M.p.:** 145-146 ºC. **R$_f$ =** 0.63 (Hexane/EtOAc 6:4).

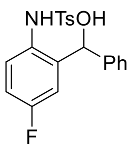
^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 8.80 (bs, 1H), 7.37 (d, *J* = 8.4 Hz, 1H), 7.33 (d, *J* = 8.4 Hz, 2H), 7.30 – 7.20 (m, 5H), 7.15 (td, *J* = 8.3, 6.3 Hz, 1H), 7.03 (d, *J* = 8.1 Hz, 2H), 6.74 (ddd, *J* = 9.5, 8.3, 1.1 Hz, 1H), 6.39 (s, 1H), 2.86 (bs, 1H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 160.1 (d, $^1J_{C\text{-}F}$ = 245.1 Hz, C), 143.7 (C), 140.7 (C), 138.14 (d, $^3J_{C\text{-}F}$ = 4.9 Hz, C), 136.0 (C), 130.0 (d, $^3J_{C\text{-}F}$ = 10.4 Hz, CH), 129.6 (2 x CH), 128.8 (2 x CH), 127.8 (CH), 127.4 (2 x CH), 125.6 (2 x CH), 118.3 (d, $^{2}J_{C\text{-}F}$ = 15.6 Hz, C), 114.8 (d, $^{4}J_{C\text{-}F}$ = 3.3 Hz, CH), 110.4 (d, $^{2}J_{C\text{-}F}$ = 23.1 Hz, CH), 68.5 (d, $^{3}J_{C\text{-}F}$ = 7.1 Hz, CH), 21.6 (CH_3).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -117.26.

HRMS (ESI-TOF): m/z calculated for $C_{20}H_{17}FNO_2S$ [M-H_2O+H]$^+$ 354.0964, found 354.0957.

***N*-(4-fluoro-2-(hydroxy(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1h''')**



General procedure was followed to obtain **1h'''** as a white solid (0.13 g, 91% yield). **M.p.:** 139-140 ºC. **R*f* =** 0.26 (Hexane/EtOAc 8:2).

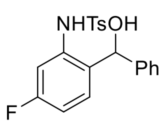
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.54 (bs, 1H), 7.52 (d, *J* = 8.3 Hz, 2H), 7.38 – 7.29 (m, 4H), 7.21 (d, *J* = 8.3 Hz, 2H), 7.13 (dd, *J* = 6.6, 2.6 Hz, 2H), 6.91 (ddd, *J* = 8.8, 7.7, 3.0 Hz, 1H), 6.64 (dd, *J* = 8.8, 3.0 Hz, 1H), 5.54 (d, *J* = 3.1 Hz, 1H), 2.72 (d, *J* = 3.1 Hz, 1H), 2.41 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 160.3 (d, $^{1}J_{C\text{-}F}$ = 245.9 Hz, C), 144.1 (C), 140.6 (C), 137.8 (d, $^{3}J_{C\text{-}F}$ = 6.9 Hz, C), 136.6 (C), 131.3 (d, $^{4}J_{C\text{-}F}$ = 3.0 Hz, C), 129.8 (2 x CH), 129.0 (2 x CH), 128.4 (CH), 127.3 (2 x CH), 126.6 (2 x CH), 126.1 (d, $^{3}J_{C\text{-}F}$ = 8.3 Hz, CH), 115.9 (d, $^{2}J_{C\text{-}F}$ = 23.9 Hz, CH), 115.6 (d, $^{2}J_{C\text{-}F}$ = 22.4 Hz, CH), 73.5 (d, $^{4}J_{C\text{-}F}$ = 1.2 Hz, CH), 21.7 (CH_3).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -115.6.

HRMS (ESI-TOF): m/z calculated for $C_{20}H_{17}FNO_2S$ [M-H_2O+H]$^+$: 354.0964, found 354.0959.

***N*-(5-fluoro-2-(hydroxy(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1i''')**



General procedure was followed to obtain **1i'''** as a yellow solid (0.20 g, >99% yield). **M.p.:** 141-142 ºC. **R*f* =** 0.60 (Hexane/EtOAc 6:4).

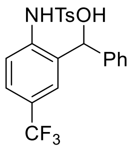
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.54 (bs, 1H), 7.52 (d, *J* = 8.3 Hz, 2H), 7.36 – 7.30 (m, 4H), 7.21 (d, *J* = 8.3 Hz, 2H), 7.15 – 7.11 (m, 2H), 6.91 (ddd, *J* = 8.8, 7.7, 3.0 Hz, 1H), 6.64 (dd, *J* = 9.2, 3.0 Hz, 1H), 5.54 (d, *J* = 3.1 Hz, 1H), 2.41 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 162.9 (d, $^{1}J_{C\text{-}F}$ = 246.8 Hz, C), 144.0 (C), 140.8 (C), 137.8 (d, $^{3}J_{C\text{-}F}$ = 10.9 Hz, C), 136.4 (C), 130.5 (d, $^{3}J_{C\text{-}F}$ = 9.6 Hz, CH), 129.8 (2 x CH), 128.9 (2 x CH), 128.2 (CH), 127.71 (d, $^{4}J_{C\text{-}F}$ = 3.4 Hz, C), 127.3 (2 x CH), 126.4 (2 x CH), 110.7 (d, $^{2}J_{C\text{-}F}$ = 21.4 Hz, CH), 108.6 (d, $^{2}J_{C\text{-}F}$ = 26.3 Hz, CH), 74.9 (CH), 21.7 (CH_3).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) –111.26.

HRMS (ESI-TOF): m/z calculated for $C_{20}H_{18}FNNaO_3S$ [M+Na]$^+$: 394.0889, found: 394.0893.

_N_-(2-(hydroxy(phenyl)methyl)-4-(trifluoromethyl)phenyl)-4-methylbenzenesulfonamide (1m''')



General procedure was followed to obtain **1m'''** as a white solid (0.167 g, 52%). **M.p.:** 144-146 ºC. **R_f =** 0.27 (Hexane/EtOAc 8:2).

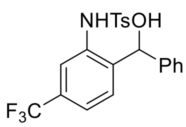
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.41 (s, 1H), 7.63 (d, J = 8.5 Hz, 1H), 7.47 (dd, J = 8.7, 2.3 Hz, 1H), 7.44 (d, J = 8.3 Hz, 2H), 7.37 – 7.32 (m, 3H), 7.24 (d, J = 2.2 Hz, 1H), 7.21 – 7.17 (m, 2H), 7.16 – 7.11 (m, 2H), 5.78 (d, J = 3.0 Hz, 1H), 2.76 (d, J = 3.3 Hz, 1H), 2.38 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 144.2 (C), 140.1 (C), 139.5 (q, $^4J_{C-F}$ = 1.8 Hz, C), 136.2 (C), 131.5 (C), 129.9 (2 x CH), 129.1 (2 x CH), 128.5 (CH), 127.3 (2 x CH), 126.3 (2 x CH), 126.2 (q, $^3J_{C-F}$ = 3.6 Hz, CH),126.2 (q, $^3J_{C-F}$ = 3.8 Hz, CH), 125.7 (q, $^2J_{C-F}$ = 32.9 Hz, C), 123.6 (q, $^1J_{C-F}$ = 272.0 Hz, C), 120.1 (CH), 75.4 (CH), 21.7 (CH_3).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -62.14.

HRMS (ESI-TOF): m/z calculated for $C_{21}H_{17}F_3NO_2S$ $[M-H_2O+H]^+$: 404.0932, found 404.0930.

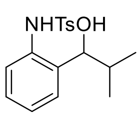
_N_-(2-(hydroxy(phenyl)methyl)-5-(trifluoromethyl)phenyl)-4-methylbenzenesulfonamide (1n''')[14]¡Error! Marcador no definido.



General procedure was followed to obtain **1n'''** as a white solid (0.34 g, 72% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 8.34 (bs, 1H), 7.72 (s, 1H), 7.45 (d, J = 8.3 Hz, 2H), 7.35 – 7.29 (m, 2H), 7.24 (d, J = 7.5 Hz, 1H), 7.18 – 7.14 (m, 5H), 7.06 (d, J = 7.5 Hz, 1H), 5.77 (s, 1H), 3.18 (bs, 1H), 2.38 (s, 3H).

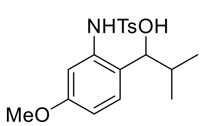
_N_-(2-(1-hydroxy-2-methylpropyl)phenyl)-4-methylbenzenesulfonamide (1q''')[14]



General procedure was followed to obtain **1q'''** as a pale yellow solid (0.16 g, 59% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 8.44 (bs, 1H), 7.68 (d, J = 8.3 Hz, 2H), 7.50 (d, J = 8.8 Hz, 1H), 7.25 – 7.13 (m, 3H), 7.06 – 6.91 (m, 2H), 4.22 (d, J = 9.1 Hz, 1H), 2.55 (bs, 1H), 2.37 (s, 3H), 1.83 – 1.58 (m, 1H), 1.00 (d, J = 6.7 Hz, 3H), 0.42 (d, J = 6.7 Hz, 3H).

_N_-(2-(1-hydroxy-2-methylpropyl)-5-methoxyphenyl)-4-methylbenzenesulfonamide (1r''')



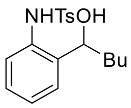
General procedure was followed to obtain **1r'''** as a pale yellow solid (0.18 g, 80% yield). **M.p.:** 126-127 ºC. **R_f =** 0.25 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.45 (bs, 1H), 7.72 (d, J = 8.3 Hz, 2H), 7.23 (d, J = 8.3 Hz, 2H), 7.15 (d, J = 2.6 Hz, 1H), 6.84 (d, J = 8.4 Hz, 1H), 6.52 (dd, J = 8.4, 2.6 Hz, 1H), 4.14 (dd, J = 9.1, 3.0 Hz, 1H), 3.76 (s, 3H), 2.38 (s, 3H), 2.19 (d, J = 3.0 Hz, 1H), 1.73 – 1.64 (m 1H), 1.00 (d, J = 6.6 Hz, 3H), 0.42 (d, J = 6.6 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 159.7 (C), 143.9 (C), 137.2 (C), 137.1 (C), 130.2 (CH), 129.7 (2 x CH), 127.3 (2 x CH), 123.7 (C), 109.6 (CH), 106.6 (CH), 81.6 (CH), 55.5 (CH), 33.6 (CH), 21.6 (CH_3), 19.6 (CH_3), 19.4 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{18}H_{23}NNaO_4S$ $[M+Na]^+$: 372.1245, found 372.1239.

***N*-(2-(1-hydroxypentyl)phenyl)-4-methylbenzenesulfonamide (1s''')**



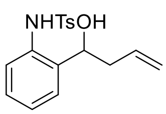
General procedure was followed to obtain **1s'''** as a white solid (0.43 g, 69% yield). **M.p.:** 133-134 ºC. **R_f =** 0.42 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 8.38 (bs, 1H), 7.69 (d, *J* = 8.3 Hz, 2H), 7.54 (d, *J* = 8.7 Hz, 1H), 7.24 – 7.17 (m, 3H), 7.09 – 6.94 (m, 2H), 4.59 (ddd, *J* = 7.9, 6.1, 3.6 Hz, 1H), 2.37 (s, 3H), 2.19 (bs, 1H), 1.66 – 1.57 (m, 1H), 1.44 (ddt, J = 13.5, 10.5, 6.1 Hz, 1H), 1.34 – 1.10 (m, 3H), 1.07 – 0.94 (m, 1H), 0.83 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 143.8 (C), 137.2 (C), 136.0 (C), 133.0 (C), 129.7 (2 x CH), 128.7 (CH), 128.0 (CH), 127.3 (2 x CH), 124.5 (CH), 121.9 (CH), 75.3 (CH), 36.4 (CH_2), 28.3 (CH_2), 22.5 (CH_2), 21.6 (CH_3), 14.1 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{18}H_{24}NO_3S$ $[M-H_2O+H]^+$: 316.1371, found 316.1365.

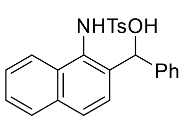
N-(2-(1-hydroxybut-3-en-1-yl)phenyl)-4-methylbenzenesulfonamide (1t''')[15]



General procedure was followed to obtain **1t'''** as a white solid (0.29 g, 65% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 8.49 (bs, 1H), 7.68 (d, *J* = 8.3 Hz, 2H), 7.45 (d, *J* = 8.1 Hz, 1H), 7.27 – 7.09 (m, 3H), 7.08 – 7.02 (m, 2H), 5.63 (dddd, *J* = 16.7, 10.2, 7.7, 6.4 Hz, 1H), 5.14 – 4.89 (m, 2H), 4.65 (dd, *J* = 8.3, 5.7 Hz, 1H), 2.65 (bs, 1H), 2.36 (s, 3H), 2.33 – 2.23 (m, 2H).

***N*-(2-(hydroxy(phenyl)methyl)naphthalen-1-yl)-4-methylbenzenesulfonamide (1u''')**



General procedure was followed to obtain **1u'''** as a pale yellow solid (0.12 g, 72% yield). **M.p.:** 143-145 ºC. **R_f =** 0.37 (Hexane/EtOAc 8:2).

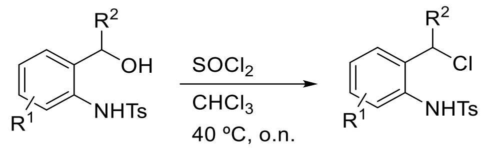
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.72 (t, *J* = 7.8 Hz, 2H), 7.50 (d, *J* = 8.3 Hz, 2H), 7.44 (d, *J* = 8.6 Hz, 1H), 7.36 (t, *J* = 7.8 Hz, 1H), 7.33 – 7.28 (m, 5H), 7.27 – 7.21 (m, 2H), 7.19 – 7.14 (m, 1H), 7.12 (d, *J* = 8.3 Hz, 2H), 6.44 (s, 1H), 3.48 (bs, 1H), 2.36 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 144.2 (C), 142.8 (C), 141.6 (C) 136.6 (C), 133.8 (C), 130.8 (C), 129.8 (2 x CH), 129.1 (CH), 128.5 (C), 128.4 (2 x CH), 128.2 (CH), 127.6 (2 x CH), 127.3 (CH), 126.5 (2 x CH), 126.5 (CH), 126.5 (CH), 126.3 (CH), 123.2 (CH), 70.8 (CH), 21.6 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{24}H_{20}NO_2S$ $[M-H_2O+H]^+$: 386.1215, found 386.1223.

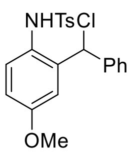
4.1.4. Synthesis of *N*-(*ortho*-chloromethyl)aryl amides (**1**)

General procedure



To a solution of *N*-protected 2-aminobenzyl alcohol (**1'''**) in $CHCl_3$ (0.1 M) is added thionyl chloride (1.2 equiv.) under an Ar atmosphere and it is stirred overnight at 40 ºC overnight. After completion of the reaction, followed by TLC the mixture is cooled down to room temperature, extracted with DCM (x3), washed with brine and dried over anhydrous Na_2SO_4. Finally, the solvent is removed under reduced pressure to afford pure *N*-(*ortho*-chloromethyl)aryl amides (**1**).

***N*-(2-(chloro(phenyl)methyl)-4-methoxyphenyl)-4-methylbenzenesulfonamide (1b)**



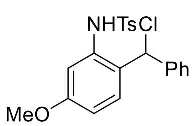
General procedure was followed to obtain **1b** as a brown solid (0.55 g, >99% yield). **M.p.:** 134-136 ºC. **R*f* =** 0.25 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.62 (d, *J* = 8.3 Hz, 2H), 7.34 – 7.27 (m, 5H), 7.19 – 7.09 (m, 3H), 6.80 – 6.69 (m, 2H), 6.29 (bs, 1H), 5.90 (s, 1H), 3.71 (s, 3H), 2.44 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 158.8 (C), 144.2 (C), 138.7 (C), 136.8 (C), 130.0 (2 x CH), 129.7 (CH), 128.8 (2 x CH), 128.5 (CH), 127.9 (2 x CH), 127.4 (2 x CH), 126.6 (C), 126.0 (C), 115.2 (CH), 114.0 (CH), 59.7 (CH), 55.5 (CH_3), 21.7 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{21}H_{20}NO_3S$ [M-HCl+H]$^+$: 366.1164, found 366.1159.

***N*-(2-(chloro(phenyl)methyl)-5-methoxyphenyl)-4-methylbenzenesulfonamide (1c)**



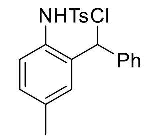
General procedure was followed to obtain **1c** as a brown solid (0.20 g, 94% yield). **M.p.:** 137-139 ºC. **R*f* =** 0.23 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.64 (d, *J* = 8.3 Hz, 2H), 7.42 – 7.26 (m, 5H), 7.19 – 7.08 (m, 2H), 7.02 (d, *J* = 2.6 Hz, 1H), 6.91 (d, J = 8.7 Hz, 1H), 6.76 (bs, 1H), 6.62 (dd, *J* = 8.7, 2.6 Hz, 1H), 5.82 (s, 1H), 3.75 (s, 3H), 2.43 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 158.8 (C), 144.2 (C), 139.1 (C), 138.7 (C), 136.8 (C), 130.0 (2 x CH), 129.7 (CH), 128.8 (2 x CH), 128.5 (CH), 127.9 (2 x CH), 127.4 (2 x CH), 126.0 (C), 115.2 (CH), 114.0 (CH), 59.7 (CH), 55.5 (CH_3), 21.7 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{21}H_{20}NO_3S$ [M-HCl+H]$^+$: 366.1164, found 366.1156.

***N*-(2-(chloro(phenyl)methyl)-4-methylphenyl)-4-methylbenzenesulfonamide (1d)**



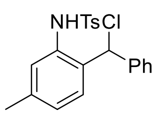
General procedure was followed to obtain **1d** as a brown solid (0.10 g, 95% yield). **M.p.:** 120-122 ºC. **R$_f$ =** 0.36 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.62 (d, *J* = 8.3 Hz, 2H), 7.38 – 7.23 (m, 5H), 7.22 – 7.11 (m, 3H), 7.06 (d, *J* = 8.1 Hz, 1H), 6.95 (s, 1H), 6.48 (bs, 1H), 5.92 (s, 1H), 2.43 (s, 3H), 2.24 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 144.0 (C), 140.3 (C), 139.3 (C), 138.7 (C), 137.3 (C), 131.3 (CH), 129.8 (2 x CH), 129.6 (C), 128.3 (2 x CH), 128.1 (CH), 128.0 (CH), 127.8 (2 x CH), 127.1 (2 x CH), 127.0 (CH), 60.1 (CH), 21.4 (CH_3), 18.6 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{21}H_{20}NO_2S$ [M-HCl+H]$^+$: 350.1215, found 350.1208.

***N*-(2-(chloro(phenyl)methyl)-5-methylphenyl)-4-methylbenzenesulfonamide (1e)**



General procedure was followed to obtain **1e** as a brown solid (0.84 g, 94% yield). **M.p.:** 120-121 ºC. **R$_f$ =** 0.34 (Hexane/EtOAc 8:2).

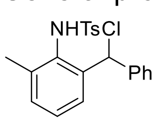
^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.64 (d, *J* = 8.3 Hz, 2H), 7.40 – 7.27 (m, 5H), 7.23 – 7.14 (m, 3H), 7.08 (d, *J* = 9.1 Hz, 1H), 6.97 (s, 1H), 6.50 (bs, 1H), 5.95 (s, 1H), 2.43 (s, 3H), 2.24 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 144.7 (C), 141.0 (C), 139.9 (C), 139.4 (C), 138.0 (C), 131.9 (CH), 130.4 (2 x CH), 130.3 (C), 128.9 (2 x CH), 128.8 (CH), 128.6 (CH), 128.5 (2 x CH), 127.7 (2 x CH), 127.6 (CH), 60.7 (CH), 22.1 (CH_3), 19.3 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{21}H_{20}NO_2S$ [M-HCl+H]$^+$: 350.1215, found 350.1209.

***N*-(2-(chloro(phenyl)methyl)-6-methylphenyl)-4-methylbenzenesulfonamide methanol (1f)**

General procedure was followed to obtain **1f** as a brown solid (0.08 g, 90% yield). **M.p.:** 122-124 ºC. **R$_f$ =** 0.33 (Hexane/EtOAc 8:2).

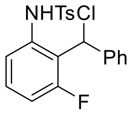


^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.68 (d, *J* = 8.3 Hz, 2H), 7.36 – 7.27 (m, 5H), 7.25 – 7.13 (m, 5H), 6.26 (s, 1H), 6.10 (bs, 1H), 2.45 (s, 3H), 2.07 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 144.4 (C), 140.6 (C), 139.6 (C), 139.1 (C), 137.6 (C), 131.6 (CH), 130.1 (2 x CH), 130.0 (C), 128.6 (2 x CH), 128.5 (CH), 128.3 (CH), 128.1 (2 x CH), 127.4 (2 x CH), 127.3 (CH), 60.4 (CH), 21.7 (CH_3), 19.0 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{21}H_{20}NO_2S$ [M-HCl+H]$^+$: 350.1215, found 350.1208.

_N_-(3-fluoro-2-(chloro(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1g)



General procedure was followed to obtain **1g** as a brown solid (0.29 g, 94% yield). **M.p.:** 153-154 ºC. **R_f =** 0.76 (Hexane/EtOAc 7:3).

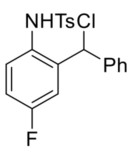
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.46 (d, J = 8.3 Hz, 2H), 7.40 – 7.30 (m, 6H), 7.29 – 7.20 (m, 1H), 7.15 (d, J = 8.1 Hz, 2H), 6.93 (bs, 1H), 6.84 (ddd, J = 9.6, 8.3, 1.1 Hz, 1H), 6.71 (d, J = 1.8 Hz, 1H), 2.37 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 160.2 (d, $^{1}J_{C-F}$ = 248.0 Hz, C), 144.3 (C), 137.43 (d, $^{3}J_{C-F}$ = 3.7 Hz, C), 130.9 (d, $^{3}J_{C-F}$ = 10.6 Hz, CH), 130.4 (C), 129.7 (2 x CH), 129.2 (2 x CH), 128.6 (CH), 127.7 (2 x CH), 127.2 (C), 126.8 (2 x CH), 117.4 (d, $^{2}J_{C-F}$ = 14.3 Hz, C), 115.7 (d, $^{4}J_{C-F}$ = 3.3 Hz, CH), 111.1 (d, $^{2}J_{C-F}$ = 23.4 Hz, CH), 53.9 (d, $^{3}J_{C-F}$ = 8.7 Hz, CH), 21.7 (CH_3).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -115.31.

HRMS (ESI-TOF): m/z calculated for $C_{20}H_{17}ClFNNaO_2S$ $[M+Na]^+$ 412.0550, found 412.0547.

_N_-(4-fluoro-2-(chloro(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1h)



General procedure was followed to obtain **1h** as a brown solid (0.60 g, 82% yield). **M.p.:** 150-151 ºC. **R_f =** 0.31 (Hexane/EtOAc 8:2).

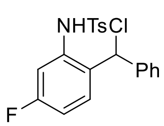
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.62 (d, J = 8.3 Hz, 1H), 7.37 – 7.20 (m, 6H), 7.14 – 7.08 (m, 2H), 6.96 (ddd, J = 9.4, 7.6, 3.0 Hz, 1H), 6.87 (dd, J = 9.4, 3.0 Hz, 1H), 6.38 (bs, 1H), 5.82 (s, 1H), 2.45 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 161.3 (d, $^{1}J_{C-F}$ = 248.1 Hz, C), 144.5 (C), 139.2 (d, $^{3}J_{C-F}$ = 7.8 Hz, C), 138.0 (C), 136.6 (C), 130.1 (2 x CH), 129.6 (d, $^{3}J_{C-F}$ = 8.6 Hz, CH), 129.6 (C), 129.0 (2 x CH), 128.9 (CH), 127.9 (2 x CH), 127.4 (2 x CH), 116.4 (d, $^{2}J_{C-F}$ = 24.9 Hz, CH), 116.3 (d, $^{2}J_{C-F}$ = 22.6 Hz, CH), 59.3 (CH), 21.7 (CH_3).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -115.3.

HRMS (ESI-TOF): m/z calculated for $C_{20}H_{17}FNO_2S$ $[M-HCl+H]^+$: 354.0964, found 354.0957.

_N_-(5-fluoro-2-(chloro(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1i)



General procedure was followed to obtain **1i** as a brown solid (0.18 g, 96% yield). **M.p.:** 165-166 ºC. **R_f =** 0.71 (Hexane/EtOAc 7:3).

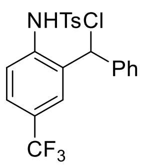
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.63 (d, J = 8.3 Hz, 2H), 7.37 – 7.31 (m, 3H), 7.28 (d, J = 7.9 Hz, 1H), 7.23 (dd, J = 9.9, 2.6 Hz, 1H), 7.18 – 7.12 (m, 2H), 7.03 (dd, J = 8.7, 6.1 Hz, 1H), 6.83 – 6.73 (m, 2H), 5.85 (s, 1H), 2.43 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 162.9 (d, $^{1}J_{C\text{-}F}$ = 249.5 Hz, C), 144.6 (C), 137.9 (C), 136.4 (C), 136.1 (d, $^{3}J_{C\text{-}F}$ = 10.9 Hz, C), 131.0 (d, $^{3}J_{C\text{-}F}$ = 9.5 Hz, CH), 130.1 (2 x CH), 129.2 (d, $^{4}J_{C\text{-}F}$ =3.4 Hz, C), 129.0 (2 x CH), 128.8 (CH), 127.7 (2 x CH), 127.4 (2 x CH), 112.8 (d, $^{2}J_{C\text{-}F}$ = 21.4 Hz, CH), 111.8 (d, $^{2}J_{C\text{-}F}$ = 25.6 Hz, CH), 60.4 (CH), 21.7 (CH_3).

^{19}F NMR (376 MHz, CDCl$_3$) δ (ppm) -110.05.

HRMS (ESI-TOF): m/z calculated for $C_{20}H_{17}FNO_2S$ [M-HCl+H]$^+$ 354.0964, found 354.0966.

***N*-(2-(chloro(phenyl)methyl)-4-(trifluoromethyl)phenyl)-4-methylbenzenesulfonamide (1o)**



General procedure was followed to obtain **1o** as an orange solid (0.131 g, 76%). **M.p.:** 155-157 ºC. **R*f* =** 0.35 (Hexane/EtOAc 8:2).

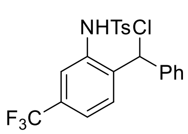
^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.62 – 7.56 (m, 3H), 7.56 – 7.51 (m, 1H), 7.44 – 7.36 (m, 4H), 7.29 – 7.25 (m, 2H), 7.22 – 7.16 (m, 2H), 6.87 (s, 1H), 5.94 (s, 1H), 2.43 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 144.8 (C), 137.8 (C), 137.2 (C), 136.2 (C), 132.8 (C), 130.1 (2 x CH), 129.3 (2 x CH), 129.2 (CH), 127.7 (2 x CH), 127.5 (q, $^{2}J_{C\text{-}F}$ = 33.0 Hz, C), 127.4 (2 x CH), 126.8 (q, $^{3}J_{C\text{-}F}$ = 3.7 Hz, CH), 126.6 (q, $^{3}J_{C\text{-}F}$ = 3.8 Hz, CH), 123.4 (q, $^{1}J_{C\text{-}F}$ = 272.4 Hz, C), 123.5 (CH), 60.4 (CH), 21.7 (CH_3).

^{19}F NMR (376 MHz, CDCl$_3$) δ (ppm) -62.39

HRMS (ESI-TOF): m/z calculated for $C_{21}H_{17}F_3NO_2S$ [M-HCl+H]$^+$: 404.0932, found 404.0925.

***N*-(2-(chloro(phenyl)methyl)-5-(trifluoromethyl)phenyl)-4-methylbenzenesulfonamide (1n)**



General procedure was followed to obtain **1n** as a yellow solid (0.30 g, 86% yield). **M.p.:** 153-154 ºC. **R*f* =** 0.32 (Hexane/EtOAc 8:2).

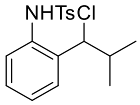
^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.61 (d, *J* = 8.3 Hz, 2H), 7.58 (s, 1H), 7.41 – 7.24 (m, 8H), 7.22 – 7.16 (m, 2H), 6.02 (s, 1H), 2.43 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 144.8 (C), 138.2 (C), 137.6 (C), 136.1 (C), 134.8 (C), 131.8 (q, $^{2}J_{C\text{-}F}$ = 33.2 Hz, C), 130.1 (3 x CH), 129.1 (2 x CH), 129.0 (CH), 127.8 (2 x CH), 127.5 (2 x CH), 125.5 (q, $^{1}J_{C\text{-}F}$ = 271.0 Hz, C), 123.1 (q, $^{3}J_{C\text{-}F}$ = 3.7 Hz, CH), 122.3 (q, $^{3}J_{C\text{-}F}$ = 3.7 Hz, CH), 59.6 (CH), 21.7 (CH_3).

^{19}F NMR (376 MHz, CDCl$_3$) δ (ppm) -63.0.

HRMS (ESI-TOF): m/z calculated for $C_{21}H_{17}F_3NO_2S$ [M-HCl+H]$^+$: 404.0932, found 404.0929.

N-(2-(1-chloro-2-methylpropyl)phenyl)-4-methylbenzenesulfonamide (1q)



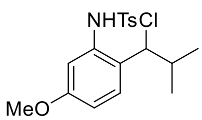
General procedure was followed to obtain **1q** as a yellow solid (0.16 g, 97% yield). **M.p.:** 135-136 ºC. **R_f =** 0.44 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.68 (d, *J* = 8.3 Hz, 2H), 7.30 (dd, *J* = 7.7, 2.0 Hz, 2H), 7.25 (d, *J* = 8.3 Hz, 2H), 7.22 (td, *J* = 7.7, 2.0 Hz, 1H), 7.17 (td, *J* = 7.7, 2.0 Hz, 1H), 6.80 (bs, 1H), 4.58 (d, *J* = 9.4 Hz, 1H), 2.39 (s, 3H), 2.39 – 2.20 (m, 1H), 1.12 (d, *J* = 6.6 Hz, 3H), 0.58 (d, *J* = 6.6 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 144.2 (C), 136.8 (C), 134.5 (C), 134.2 (C), 129.9 (2 x CH), 129.1 (CH), 128.9 (CH), 127.4 (2 x CH), 126.5 (CH), 125.3 (CH), 67.0 (CH), 34.6 (CH), 21.7 (CH_3), 20.6 (CH_3), 20.3 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{17}H_{20}NO_2S$ $[M-HCl+H]^+$: 302.1215, found 302.1209.

N-(2-(1-chloro-2-methylpropyl)-5-methoxyphenyl)-4-methylbenzenesulfonamide (1r)



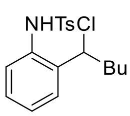
General procedure was followed to obtain **1r** as a yellow solid (0.11 g, 99% yield). **M.p.:** 142-144 ºC. **R_f =** 0.33 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.63 (d, J = 8.4 Hz, 2H), 7.25 (d, J = 8.4 Hz, 2H), 6.99 (d, J = 8.9 Hz, 1H), 6.93 (d, J = 3.0 Hz, 1H), 6.70 (dd, J = 8.9, 3.0 Hz, 1H), 6.54 (bs, 1H), 4.75 (d, J = 8.7 Hz, 1H), 3.77 (s, 3H), 2.40 (s, 3H), 2.16 (dhept, J = 8.7, 6.6 Hz, 1H), 1.08 (d, J = 6.6 Hz, 3H), 0.66 (d, J = 6.6 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 158.7 (C), 144.0 (C), 139.3 (C), 136.6 (C), 129.8 (2 x CH), 129.0 (CH), 127.5 (2 x CH), 126.0 (C), 113.9 (CH), 113.9 (CH), 65.4 (CH), 55.6 (CH_3), 35.0 (CH), 21.6 (CH_3), 20.2 (CH_3), 20.0 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{18}H_{22}NO_3S$ $[M-HCl+H]^+$: 332.1320, found 332.1315.

N-(2-(1-chloropentyl)phenyl)-4-methylbenzenesulfonamide (1s)



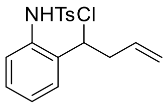
General procedure was followed to obtain **1s** as a yellow solid (0.42 g, 92% yield). **M.p.:** 136-138 ºC. **R_f =** 0.47 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.63 (d, *J* = 8.3 Hz, 2H), 7.38 – 7.30 (m, 2H), 7.29 – 7.15 (m, 4H), 6.69 (bs, 1H), 4.72 (dd, *J* = 10.2, 5.5 Hz, 1H), 2.40 (s, 3H), 2.04 (ddt, *J* = 14.0, 10.2, 5.5 Hz, 1H), 1.82 (ddt, *J* = 14.0, 10.2, 5.5 Hz, 1H), 1.41 – 1.19 (m, 3H), 1.08 (ddt, *J* = 14.0, 10.2, 5.5 Hz, 1H), 0.88 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 144.1 (C), 136.8 (C), 135.5 (C), 134.1 (C), 129.9 (2 x CH), 129.4 (CH), 127.5 (CH), 127.3 (2 x CH), 127.0 (CH), 126.1 (CH), 59.4 (CH), 37.1 (CH_2), 29.5 (CH_2), 22.3 (CH_2), 21.7 (CH_3), 14.1 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{18}H_{22}NO_2S$ $[M-HCl+H]^+$: 316.1371, found 316.1365.

N-(2-(1-chlorobut-3-en-1-yl)phenyl)-4-methylbenzenesulfonamide (1t)



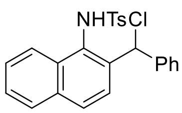
General procedure was followed to obtain **1t** as a yellow solid (0.28 g, 90% yield). **M.p.:** 133-135 ºC. **R_f =** 0.45 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.62 (d, *J* = 8.3 Hz, 2H), 7.44 – 7.34 (m, 1H), 7.29 – 7.12 (m, 5H), 6.81 (bs, 1H), 5.61 (ddt, *J* = 17.1, 10.4, 6.7 Hz, 1H), 5.11 – 4.99 (m, 2H), 4.90 (dd, *J* = 8.7, 5.9 Hz, 1H), 2.85 – 2.70 (m, 1H), 2.68 – 2.59 (m, 1H), 2.39 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 144.2 (C), 136.5 (C), 135.9 (C), 133.7 (C), 133.6 (CH), 129.9 (2 x CH), 129.4 (CH), 127.7 (CH), 127.3 (2 x CH), 127.3 (CH), 126.5 (CH), 118.6 (CH_2), 57.7 (CH), 41.8 (CH_2), 21.6 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{17}H_{18}NO_2S$ [M-HCl+H]$^+$: 300.1058, found 300.1052.

N-(2-(chloro(phenyl)methyl)naphthalen-1-yl)-4-methylbenzenesulfonamide (1u)



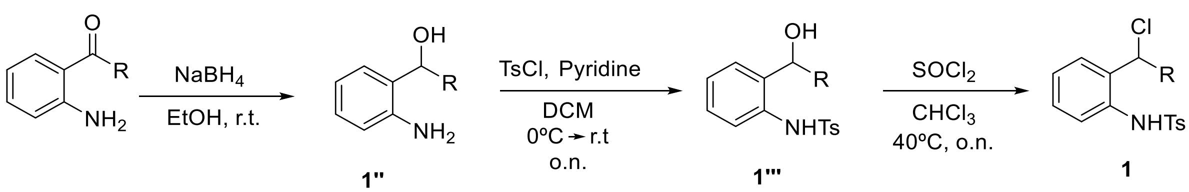
General procedure was followed to obtain **1u** as a brown solid (0.07 g, 85% yield). **M.p.:** 147-148 ºC. **R_f =** 0.44 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.74 (d, *J* = 6.3 Hz, 1H), 7.71 (d, *J* = 6.3 Hz, 1H), 7.50 (d, *J* = 8.3 Hz, 2H), 7.42 (t, *J* = 8.1 Hz, 2H), 7.38 – 7.28 (m, 7H), 7.13 (d, *J* = 8.3 Hz, 2H), 6.86 (bs, 1H), 6.43 (s, 1H), 2.37 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 144.3 (C), 142.8 (C), 141.6 (C), 136.5 (C), 133.8 (C), 130.8 (C), 130.4 (C), 129.8 (2 x CH), 129.2 (CH), 128.4 (2 x CH), 128.2 (CH), 127.6 (2 x CH), 127.4 (CH), 126.6 (2 x CH), 126.5 (2 x CH), 126.3 (CH), 123.1 (CH), 70.9 (CH), 21.7 (CH_3).

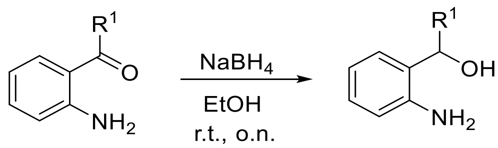
HRMS (ESI-TOF): m/z calculated for $C_{24}H_{20}NO_2S$ [M-HCl+H]$^+$: 386.1215, found 386.1208.

4.2. Route 2



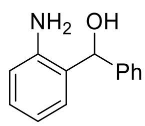
4.2.1. Synthesis of amino benzyl alcohols (1'')

General procedure



2-aminoketone (1.0 equiv.) is added to a Schlenk flask and dissolved in absolute EtOH (0.2 M), under Ar atmosphere. Next, $NaBH_4$ (2.0 equiv.) is added, and the resulting mixture is stirred overnight at room temperature. After completion of the reaction, the solvent is removed under reduced pressure. The residue is dissolved in EtOAc and H_2O, extracted with EtOAc (x3) and dried over anhydrous Na_2SO_4. Finally, the solvent is removed under reduced pressure affording amino benzyl alcohols (**1''**).

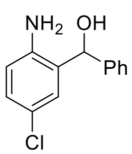
(2-aminophenyl)(phenyl)methanol (1a'')[9]



General procedure was followed to obtain **1a''** as a pale yellow solid (0.84 g, 83% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.46 – 7.27 (m, 5H), 7.13 (td, *J* = 7.6, 1.6 Hz, 1H), 7.04 (dd, *J* = 7.6, 1.6 Hz, 1H), 6.75 (td, *J* = 7.5, 1.2 Hz, 1H), 6.68 (dd, *J* = 7.9, 1.2 Hz, 1H), 5.87 (s, 1H), 3.20 (bs, 3H).

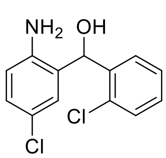
(2-amino-5-chlorophenyl)(phenyl)methanol (1j'')[9]



General procedure was followed to obtain **1j''** as a pale yellow solid (1.00 g, >99% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.44 – 7.28 (m, 5H), 7.13 – 7.01 (m, 2H), 6.59 (d, *J* = 8.1 Hz, 1H), 5.79 (s, 1H), 3.93 (bs, 2H), 2.63 (bs, 1H).

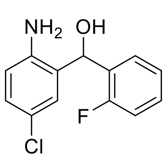
(2-amino-5-chlorophenyl)(2-chlorophenyl)methanol (1k'')[9]



General procedure was followed to obtain **1k''** as a pale yellow solid (1.00 g, >99% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.53 – 7.44 (m, 1H), 7.44 – 7.35 (m, 1H), 7.36 – 7.28 (m, 2H), 7.07 (dd, *J* = 8.5, 2.5 Hz, 1H), 6.88 (d, *J* = 2.5 Hz, 1H), 6.64 (d, *J* = 8.5 Hz, 1H), 6.16 (s, 1H), 2.68 (bs, 1H).

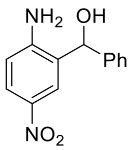
(2-amino-5-chlorophenyl)(2-fluorophenyl)methanol (1l'')[9]



General procedure was followed to obtain **1l''** as a pale brown solid (1.00 g, >99% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.40 (td, *J* = 7.6, 2.0 Hz, 1H), 7.34 – 7.29 (m, 1H), 7.17 (t, *J* = 7.6 Hz, 1H), 7.10 – 7.04 (m, 2H), 6.97 (d, *J* = 2.0 Hz, 1H), 6.58 (d, *J* = 8.4 Hz, 1H), 6.03 (s, 1H), 4.07 (bs, 2H), 3.00 (bs, 1H)

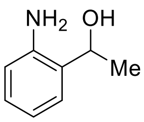
(2-amino-5-nitrophenyl)(phenyl)methanol (1o'')[9]



General procedure was followed to obtain **1o''** as a yellow solid (0.98 g, 97% yield).

^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 8.07 – 7.96 (m, 2H), 7.43 – 7.31 (m, 5H), 6.60 (d, *J* = 8.0 Hz, 1H), 5.88 (s, 1H), 4.88 (bs, 2H), 2.64 (bs, 1H).

1-(2-aminophenyl)ethan-1-ol (1p'')[11]

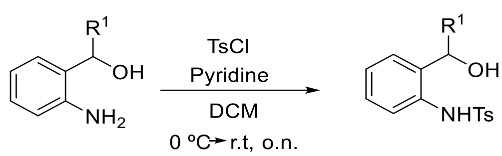


General procedure was followed to obtain **1p''** as a white solid (0.24 g, >99% yield).

^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 7.15 – 7.03 (m, 2H), 6.80 – 6.57 (m, 2H), 4.93 (q, *J* = 6.6 Hz, 1H), 3.98 (bs, 2H), 1.59 (d, *J* = 6.6 Hz, 3H).

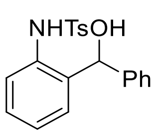
4.2.2. Synthesis of *N*-protected aminobenzyl alcohols (**1'''**)

General procedure



2-aminobenzyl alcohol (**1''**, 1.0 equiv.) in DCM (0.3 M) is added to a Schlenk previously dried and under argon. Next, pyridine (1.1 equivalents) and tosyl chloride (1.05 equivalents) are added at 0 ºC. The resulting mixture is stirred overnight at room temperature until completion of the reaction (monitored by TLC). Next, the mixture is treated with 1 M HCl. The aqueous layer is extracted with DCM (x3), and the combined organic layers are washed with brine and dried over anhydrous Na_2SO_4. The residue was purified by flash chromatography using hexane/EtOAc as eluent to afford the corresponding products (**1'''**).

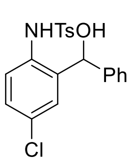
***N*-(2-(hydroxy(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1a''')[13]**



General procedure was followed to obtain **1a'''** as a white solid (2.19 g, >99% yield).

^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 7.97 (bs, 1H), 7.48 (d, *J* = 8.4 Hz, 3H), 7.35 – 7.28 (m, 3H), 7.26 – 7.11 (m, 5H), 7.08 – 6.96 (m, 1H), 6.92 (dd, *J* = 7.6, 1.5 Hz, 1H), 5.67 (d, *J* = 3.5 Hz, 1H), 2.59 (d, *J* = 3.6 Hz, 1H), 2.38 (s, 3H).

***N*-(5-chloro-2-(hydroxy(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1j''')**



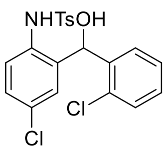
General procedure was followed to obtain **1j'''** as a pale yellow solid (1.42 g, 83% yield). **M.p.:** 143-145 ºC. **R$_f$ =** 0.26 (Hexane/EtOAc 8:2).

^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.47 (d, *J* = 8.4 Hz, 2H), 7.40 (d, *J* = 8.7 Hz, 1H), 7.36 – 7.29 (m, 3H), 7.22 – 7.10 (m, 5H), 6.91 (d, *J* = 2.5 Hz, 1H), 5.58 (s, 1H), 2.76 (bs, 1H), 2.39 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 144.1 (C), 140.4 (C), 136.4 (C), 135.2 (C), 134.4 (C), 130.3 (C), 129.8 (2 x CH), 129.0 (CH), 129.04 (CH), 120.01 (2 x CH), 128.4 (CH), 127.3 (2 x CH), 126.5 (2 x CH), 123.8 (CH), 74.3 (CH), 21.7 (CH$_3$).

HRMS (ESI-TOF): m/z calculated for $C_{20}H_{17}ClNO_2S$ [M-H_2O+H]$^+$: 370.0669, found 370.0661.

***N*-(5-chloro-2-((2-chlorophenyl)(hydroxy)methyl)phenyl)-4-methylbenzenesulfonamide (1k''')**



General procedure was followed to obtain **1k'''** as a pale yellow solid (1.19 g, 74% yield). **M.p.:** 151-153 ºC. **R*f* =** 0.25 (Hexane/EtOAc 8:2).

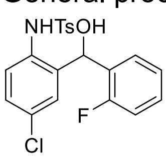
^{1}H NMR (400 MHz, CDCl$_3$) δ (ppm) 7.71 (bs, 1H), 7.65 (d, *J* = 8.3 Hz, 2H), 7.49 – 7.42 (m, 1H), 7.36 – 7.22 (m, 6H), 7.17 (dd, *J* = 8.6, 2.4 Hz, 1H), 6.72 (d, *J* = 2.4 Hz, 1H), 5.98 (d, *J* = 4.3 Hz, 1H), 3.13 (d, *J* = 4.3 Hz, 1H), 2.41 (s, 3H).

^{13}C NMR (101 MHz, CDCl$_3$) δ (ppm) 144.4 (C), 138.2 (C), 136.4 (C), 136.3 (C), 134.0 (C), 132.6 (C), 131.8 (C), 130.0 (2 x CH), 129.9 (CH), 129.7 (CH), 129.1 (CH), 128.7 (CH), 128.4 (CH), 127.6 (CH), 127.4 (2 x CH), 125.9 (CH), 70.0 (CH), 21.7 (CH$_3$).

HRMS (ESI-TOF): m/z calculated for $C_{20}H_{16}Cl_2NO_2S$ [M-H_2O+H]$^+$: 404.0279, found 404.0268

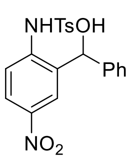
***N*-(5-chloro-2-((2-fluorophenyl)(hydroxy)methyl)phenyl)-4-methylbenzenesulfonamide (1l''')**[16]

General procedure was followed to obtain **1l'''** as a pale yellow solid (1.26 g, 68% yield).



^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 7.98 (bs, 1H), 7.62 (d, *J* = 8.4 Hz, 2H), 7.34 – 7.28 (m, 4H), 7.24 – 7.10 (m, 3H), 6.94 (t, *J* = 7.5 Hz, 1H), (6.83 (s, 1H), 5.85 (s, 1H), 3.31 (bs, 1H), 2.37 (s, 3H).

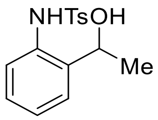
***N*-(2-(hydroxy(phenyl)methyl)-5-nitrophenyl)-4-methylbenzenesulfonamide (1o''')**[17]



General procedure was followed to obtain **1o'''** as a yellow solid (1.22 g, 76% yield).

^{1}H NMR (300 MHz, CDCl$_3$) δ (ppm) 8.95 (bs, 1H), 8.03 (dd, *J* = 9.0, 2.6 Hz, 1H), 7.88 (d, *J* = 2.6 Hz, 1H), 7.60 (d, *J* = 9.1 Hz, 1H), 7.38 (d, *J* = 8.3 Hz, 2H), 7.38 – 7.26 (m, 3H), 7.24 – 7.16 (m, 2H), 7.11 (d, *J* = 8.3 Hz, 2H), 5.86 (s, 1H), 3.63 (bs, 1H), 2.35 (s, 3H).

***N*-(2-(1-hydroxyethyl)phenyl)-4-methylbenzenesulfonamide (1p''')**[13]

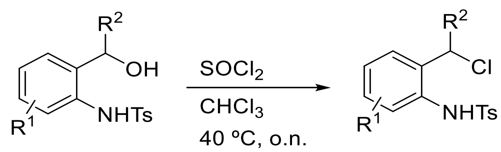


General procedure was followed to obtain **1p'''** as a white solid (0.95 g, 89% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 8.37 (bs, 1H), 7.70 (d, *J* = 8.0 Hz, 2H), 7.45 (d, *J* = 8.1 Hz, 1H), 7.24 – 7.16 (m, 3H), 7.13 – 6.98 (m, 2H), 4.84 (q, *J* = 6.6 Hz, 1H), 2.38 (s, 3H), 2.21 (bs, 1H), 1.38 (d, *J* = 6.6 Hz, 3H).

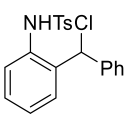
4.2.3. Synthesis of *N*-(*ortho*-chloromethyl)aryl amides (1)

General procedure



To a solution of *N*-protected 2-aminobenzyl alcohol (**1'''**) in $CHCl_3$ (0.1 M) is added thionyl chloride (1.2 equiv.) under an Ar atmosphere and it is stirred overnight at 40ºC overnight. After completion of the reaction, followed by TLC the mixture is cooled down to room temperature, extracted with DCM (x3), washed with brine and dried over anhydrous Na_2SO_4. Finally, the solvent is removed under reduced pressure to afford pure *N*-(*ortho*-chloromethyl)aryl amides (**1**).

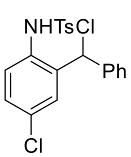
***N*-(2-(chloro(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1a)**[16]



General procedure was followed to obtain **1a** as a brown solid (1.01 g, 97% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.62 (d, *J* = 8.3 Hz, 2H), 7.48 – 7.20 (m, 7H), 7.21 – 7.05 (m, 4H), 6.64 (bs, 1H), 5.90 (s, 1H), 2.43 (s, 3H).

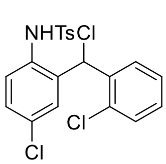
***N*-(5-chloro-2-(chloro(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1j)**[18]



General procedure was followed to obtain **1j** as a brown solid (1.28 g, 86% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.61 (d, J = 8.3 Hz, 2H), 7.37 – 7.33 (m, 3H), 7.32 – 7.28 (m, 2H), 7.27 (s, 1H), 7.23 (dd, *J* = 8.6, 2.4 Hz, 1H), 7.13 (dd, *J* = 7.0, 2.4 Hz, 3H), 6.57 (bs, 1H), 5.82 (s, 1H), 2.44 (s, 3H).

***N*-(5-chloro-2-(chloro(2-chlorophenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1k)**



General procedure was followed to obtain **1k** as a brown solid (1.08 g, 87% yield). **M.p.:** 155-157 ºC. **R_f =** 0.37 (Hexane/EtOAc 8:2).

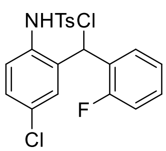
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.69 – 7.59 (m, 3H), 7.55 – 7.42 (m, 3H), 7.39 – 7.21 (m, 4H), 7.08 (d, *J* = 2.4 Hz, 1H), 6.21 (d, *J* = 2.4 Hz, 1H), 5.99 (bs, 1H), 2.41 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 144.0 (C), 137.9 (C), 136.1 (C), 136.0 (C), 133.7 (C), 132.3 (C), 131.5 (C), 129.7 (2 x CH), 129.5 (CH), 129.4 (CH), 128.8 (CH), 128.4 (CH), 128.1 (CH), 127.3 (CH), 127.1 (2 x CH), 125.6 (CH), 69.7 (CH), 21.4 (CH_3).

HRMS (ESI-TOF): m/z calculated for $C_{20}H_{16}Cl_2NO_2S$ $[M-HCl+H]^+$: 404.0279, found 404.0272.

***N*-(5-chloro-2-(chloro(2-fluorophenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1l)**

General procedure was followed to obtain **1l** as a brown solid (0.66 g, 89% yield). **M.p.:** 154-155 ºC. **R_f =** 0.39 (Hexane/EtOAc 8:2).



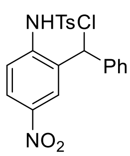
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.63 (d, *J* = 8.5 Hz, 2H), 7.40 (td, *J* = 7.7, 1.8 Hz, 1H), 7.35 – 7.27 (m, 2H), 7.27 – 7.20 (m, 4H), 7.16 (td, *J* = 7.7, 1.2 Hz, 1H), 7.01 (ddd, *J* = 9.7, 8.3, 1.2 Hz, 1H), 6.67 (bs, 1H), 6.11 (s, 1H), 2.40 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 159.3 (d, $^{1}J_{C-F}$ = 249.4 Hz, C), 144.5 (C), 136.3 (C), 136.0 (C), 132.7 (C), 132.3 (C), 130.9 (d, $^{3}J_{C-F}$ = 8.4 Hz, CH), 130.1 (2 x CH), 129.7 (CH), 129.6 (d, $^{4}J_{C-F}$ = 2.5 Hz, CH), 129.0 (CH), 127.8 (CH), 127.2 (2 x CH), 125.6 (d, $^{2}J_{C-F}$ = 12.8 Hz, C), 124.9 (d, $^{3}J_{C-F}$ = 3.6 Hz, CH), 116.0 (d, $^{2}J_{C-F}$ = 21.3 Hz, CH), 52.8 (d, $^{3}J_{C-F}$ = 4.3 Hz, CH), 21.7 (CH_3).

^{19}F NMR (376 MHz, $CDCl_3$) δ (ppm) -116.3.

HRMS (ESI-TOF): m/z calculated for $C_{20}H_{16}ClFNO_2S$ $[M-HCl+H]^+$: 388.0574, found 388.0567.

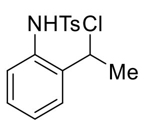
***N*-(2-(chloro(phenyl)methyl)-5-nitrophenyl)-4-methylbenzenesulfonamide (1o)[16]**



General procedure was followed to obtain **1o** as a yellow solid (0.23 g, 87% yield).

^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 8.14 (dd, *J* = 9.0, 2.6 Hz, 1H), 8.07 (d, *J* = 2.6 Hz, 1H), 7.67 (d, *J* = 9.0 Hz, 1H), 7.57 (d, *J* = 8.4 Hz, 2H), 7.47 – 7.36 (m, 3H), 7.33 – 7.22 (m, 4H), 7.21 (bs, 1H), 6.02 (s, 1H), 2.41 (s, 3H).

***N*-(2-(1-chloroethyl)phenyl)-4-methylbenzenesulfonamide (1p)[18]**



General procedure was followed to obtain **1p** as a pale-brown solid (0.30 g, 92% yield).

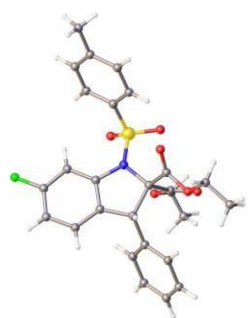
^{1}H NMR (300 MHz, $CDCl_3$) δ (ppm) 7.64 (d, *J* = 8.2 Hz, 2H), 7.52 – 7.34 (m, 1H), 7.33 – 7.12 (m, 5H), 6.69 (bs, 1H), 5.06 (q, *J* = 6.8 Hz, 1H), 2.41 (s, 3H), 1.73 (d, *J* = 6.7 Hz, 3H).

5. X-Ray Crystallographic Data

Structure Report for **3i**

Crystallographic data are presented in Tables S9-16. A single crystal of **3i** was coated in high- vacuum grease and mounted on a glass fibre. X-ray measurements were made using a Bruker D8 VENTURE PhtotonIII area-detector diffractometer with Cu-K_{α} radiation (α = 1.54 Å). Absorption corrections were applied, based on multiple and symmetry-equivalent measurements. The structure was solved by ShelXT structure solution program using Intrinsic Phasing and refined with the XL refinement package using Least Squares minimisation.

All non-hydrogen atoms were assigned anisotropic displacement parameters and refined without positional constraints and all other hydrogen atoms were constrained to ideal geometries and refined with fixed isotropic displacement parameters. Refinement proceeded smoothly to give the residuals shown in Table S10.



A colorless needle-like specimen of $C_{28}H_{29}NO_6S$, approximate dimensions 0.020 mm x 0.020 mm x 0.250 mm, was used for the X-ray crystallographic analysis. The X-ray intensity data were measured (λ = 1.54184 Å).

References

1. Sheldrick, G.M. (2015). Acta Cryst A71, 3-8; APEX3 Version 2016.7 (Bruker AXS Inc.) Bruker Instrument Service vV6.2.10
2. SAINT integration software, SAINT V8.38A (Bruker AXS Inc., 2017)
3. SADABS-2016/2 - Bruker AXS area detector scaling and absorption correction (Sheldrick, Bruker AXS Inc.)
4. *SHELXTL program system version 6.1;* XPREP Version 2013/3 (Sheldrick, Bruker AXS Inc.) XS Version 2013/1 (George M. Sheldrick, *Acta Cryst.* (2008). A**64**, 112-122)
5. *International Tables for Crystallography*, Kluwer, Dordrecht, 1992, vol. C.

Table S9: Data collection details for 3i.

Axis	dx/mm	2θ/°	ω/°	φ/°	χ/°	Width/°	Frames	Time/s	Wavelength/Å	Voltage/kV	Current/mA	Temperature/K
Phi	39.937	108.54	12.46	0.00	24.00	2.00	180	20.00	1.54184	50	1.1	299
Phi	39.937	93.54	91.60	0.00	-44.50	2.00	180	20.00	1.54184	50	1.1	299
Omega	39.937	108.54	-6.83	120.00	61.50	2.00	61	20.00	1.54184	50	1.1	299
Omega	39.937	108.54	-6.83	-40.00	61.50	2.00	61	20.00	1.54184	50	1.1	299
Omega	39.937	-48.14	-53.09	0.00	-61.50	2.00	55	20.00	1.54184	50	1.1	299
Omega	39.937	-33.14	-132.81	0.00	44.50	2.00	51	20.00	1.54184	50	1.1	299
Omega	39.937	-33.14	-132.81	180.00	44.50	2.00	51	20.00	1.54184	50	1.1	299
Omega	39.937	-33.14	-132.81	90.00	44.50	2.00	51	20.00	1.54184	50	1.1	299
Phi	39.937	108.54	108.81	0.00	-24.00	2.00	180	20.00	1.54184	50	1.1	299
Omega	39.937	108.54	-6.83	160.00	61.50	2.00	61	20.00	1.54184	50	1.1	299
Omega	39.937	-48.14	-53.09	102.00	-61.50	2.00	55	20.00	1.54184	50	1.1	299
Omega	39.937	-33.14	-132.81	270.00	44.50	2.00	51	20.00	1.54184	50	1.1	299
Omega	39.937	78.54	76.60	90.00	-44.50	2.00	49	20.00	1.54184	50	1.1	299
Omega	39.937	108.54	-6.83	-120.00	61.50	2.00	61	20.00	1.54184	50	1.1	299
Omega	39.937	108.54	-6.83	40.00	61.50	2.00	61	20.00	1.54184	50	1.1	299
Omega	39.937	108.54	-6.83	0.00	61.50	2.00	61	20.00	1.54184	50	1.1	299
Omega	39.937	108.54	-6.83	-160.00	61.50	2.00	61	20.00	1.54184	50	1.1	299
Omega	39.937	108.54	-6.83	-80.00	61.50	2.00	61	20.00	1.54184	50	1.1	299
Phi	39.937	78.54	76.60	0.00	-44.50	2.00	180	20.00	1.54184	50	1.1	299
Omega	39.937	108.54	-6.83	80.00	61.50	2.00	61	20.00	1.54184	50	1.1	299
Omega	39.937	93.54	91.60	90.00	-44.50	2.00	42	20.00	1.54184	50	1.1	299
Omega	39.937	-18.14	-124.02	0.00	44.50	2.00	54	20.00	1.54184	50	1.1	299
Omega	39.937	93.54	91.60	270.00	-44.50	2.00	42	20.00	1.54184	50	1.1	299
Phi	39.937	108.54	106.60	0.00	-44.50	2.00	180	20.00	1.54184	50	1.1	299

A total of 1950 frames were collected. The total exposure time was 10.83 hours. The frames were integrated with the Bruker SAINT software package using a narrow-frame algorithm.

The integration of the data using a triclinic unit cell yielded a total of 38299 reflections to a maximum θ angle of 72.46° (0.81 Å resolution). The final cell constants of a = 8.5340(3) Å, b = 12.5869(5) Å, c = 13.8198(5) Å, α = 66.3222(18)°, β = 89.4195(19)°, γ = 71.4322(18)°, volume = 1276.84(8) Å3, are based upon the refinement of the XYZ-centroids of 8147 reflections above 20 σ(I) with 7.049° < 2θ < 144.2°. Data were corrected for absorption effects using the Multi-Scan method (SADABS). The ratio of minimum to maximum apparent transmission was 0.783.

Table S10 Crystal data and structure refinement for **3i.**

Identification code	**3i**
Empirical formula	$C_{27}H_{26}FNO_6S$
Formula weight	511.55
Temperature/K	299.0
Crystal system	triclinic
Space group	P-1
a/Å	8.532(6)
b/Å	12.602(7)
c/Å	13.827(7)
α/°	66.33(4)
β/°	89.21(3)
γ/°	71.32(3)
Volume/Å^3	1278.6(14)
Z	2
ρ_{calc}g/cm^3	1.329
μ/mm^{-1}	1.550
F(000)	536.0
Crystal size/mm^3	0.25 × 0.02 × 0.02
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	7.042 to 145.006
Index ranges	$-10 \le h \le 10$, $-15 \le k \le 15$, $-17 \le l \le 17$
Reflections collected	37546
Independent reflections	5024 [R_{int} = 0.0696, R_{sigma} = 0.0355]
Data/restraints/parameters	5024/2/317
Goodness-of-fit on F^2	1.065
Final R indexes [I>=2σ (I)]	R_1 = 0.0847, wR_2 = 0.2431
Final R indexes [all data]	R_1 = 0.1097, wR_2 = 0.2805
Largest diff. peak/hole / e Å^{-3}	1.03/-1.07

Table S11 Fractional Atomic Coordinates (×10[4]) and Equivalent Isotropic Displacement Parameters
($Å^2 \times 10^3$) for **3i**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	*x*	*y*	*z*	U(eq)
S1	8377.0(11)	6084.1(9)	2540.8(7)	59.8(4)
O1	9630(3)	4938(3)	3187(2)	69.0(7)
O2	8461(4)	6697(3)	1430(2)	74.5(8)
O4	6607(5)	3001(3)	4910(2)	78.6(9)
O3	6990(4)	4690(3)	4870(2)	74.3(8)
N1	6598(4)	5800(3)	2676(2)	55.2(7)
O6	7906(4)	4161(3)	1844(2)	79.4(9)
O5	8644(5)	2591(3)	3469(3)	91.2(10)
C1	5102(4)	6627(3)	1992(3)	55.3(8)
C6	3966(5)	6025(4)	2081(3)	61.0(9)
C8	6533(4)	4539(3)	3215(3)	54.5(8)
C22	6770(5)	4097(3)	4428(3)	58.7(9)
C7	4672(5)	4688(4)	2856(3)	59.8(9)
C15	8257(5)	7138(4)	3096(3)	63.3(9)
C2	4702(5)	7869(4)	1344(3)	68.8(10)
C20	8493(5)	6739(4)	4186(3)	66.1(10)
C25	7840(5)	3627(4)	2877(3)	64.2(9)
C5	2371(5)	6690(5)	1525(4)	82.1(13)
C9	4503(5)	3782(4)	2434(3)	68.2(10)
C19	8500(6)	7563(4)	4605(4)	76.6(12)
C23	6759(10)	2487(5)	6066(4)	116.9(16)
C16	8060(6)	8353(4)	2418(4)	81.0(13)
C3	3103(6)	8473(4)	822(4)	83.6(13)
C4	1928(6)	7946(5)	879(4)	94.1(15)
C14	4368(7)	2669(5)	3126(5)	95.1(16)
C18	8261(7)	8793(4)	3952(5)	87.9(14)
C10	4448(7)	4036(5)	1367(4)	90.3(15)
C17	8052(8)	9164(4)	2855(5)	97.9(17)
C13	4212(10)	1841(6)	2735(7)	125(2)
C24	6730(15)	1233(8)	6446(7)	166(3)
C21	8267(10)	9660(5)	4443(6)	126(2)
C11	4294(9)	3197(7)	988(6)	116(2)
C12	4143(9)	2129(7)	1669(7)	117(2)
C26	9341(10)	3532(5)	1425(5)	116.9(16)
C27	9132(15)	2650(8)	1245(7)	166(3)
F1	2673(5)	9724(3)	183(3)	128.5(13)

Table S12 Anisotropic Displacement Parameters (Å^2×10^3) for **3i**. The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
S1	54.3(5)	64.6(6)	64.0(6)	-25.3(4)	12.0(4)	-27.2(4)
O1	54.6(14)	66.4(16)	83.9(18)	-31.2(14)	4.9(13)	-18.1(12)
O2	76.4(18)	89(2)	66.1(16)	-27.9(15)	24.2(14)	-44.4(16)
O4	130(3)	64.9(16)	56.7(15)	-27.5(13)	20.3(16)	-50.8(17)
O3	106(2)	76.1(18)	61.4(15)	-35.0(14)	16.0(15)	-49.7(17)
N1	54.6(16)	55.6(16)	55.2(16)	-19.4(13)	7.8(12)	-23.8(13)
O6	91(2)	86(2)	69.5(18)	-41.7(16)	31.6(15)	-30.1(17)
O5	104(2)	66.9(19)	92(2)	-36.0(17)	15.4(18)	-11.8(17)
C1	53.0(18)	64(2)	50.9(18)	-26.0(16)	7.8(14)	-20.7(16)
C6	55.2(19)	78(2)	60(2)	-35.8(19)	12.9(16)	-27.1(18)
C8	59.6(19)	55.8(19)	54.0(18)	-25.3(15)	11.3(15)	-24.4(16)
C22	65(2)	59(2)	57(2)	-24.6(17)	10.4(16)	-26.3(17)
C7	64(2)	74(2)	55.8(19)	-31.7(18)	18.4(16)	-36.4(19)
C15	58(2)	60(2)	72(2)	-21.8(18)	1.9(17)	-28.3(17)
C2	71(2)	65(2)	60(2)	-18.8(18)	4.9(18)	-21.5(19)
C20	66(2)	58(2)	73(2)	-24.3(18)	-3.1(18)	-23.7(18)
C25	70(2)	61(2)	70(2)	-31.8(19)	14.7(19)	-28.0(19)
C5	58(2)	107(4)	87(3)	-44(3)	8(2)	-31(2)
C9	71(2)	77(3)	76(2)	-38(2)	16.2(19)	-43(2)
C19	80(3)	69(3)	80(3)	-30(2)	-13(2)	-26(2)
C23	180(5)	85(3)	80(2)	-36(2)	40(3)	-37(3)
C16	98(3)	66(3)	77(3)	-16(2)	-1(2)	-43(2)
C3	77(3)	74(3)	72(3)	-15(2)	-4(2)	-11(2)
C4	68(3)	100(4)	90(3)	-29(3)	-8(2)	-11(3)
C14	114(4)	85(3)	101(4)	-33(3)	8(3)	-60(3)
C18	89(3)	65(3)	111(4)	-38(3)	-15(3)	-27(2)
C10	121(4)	107(4)	82(3)	-57(3)	28(3)	-67(3)
C17	124(4)	61(3)	104(4)	-19(3)	-16(3)	-43(3)
C13	151(6)	88(4)	153(6)	-44(4)	-5(5)	-70(4)
C24	257(9)	141(5)	116(4)	-55(4)	34(5)	-86(5)
C21	161(6)	73(3)	150(6)	-54(4)	-33(5)	-36(4)
C11	148(6)	137(5)	119(5)	-88(4)	29(4)	-76(5)
C12	132(5)	115(5)	147(6)	-82(5)	7(4)	-60(4)
C26	180(5)	85(3)	80(2)	-36(2)	40(3)	-37(3)
C27	257(9)	141(5)	116(4)	-55(4)	34(5)	-86(5)
F1	124(3)	78.4(19)	116(3)	4.7(18)	-24(2)	-7.9(18)

Table S13 Bond Lengths for **3i.**

Atom	Atom	Length/Å	Atom	Atom	Length/Å
S1	O1	1.425(3)	C15	C20	1.378(6)
S1	O2	1.429(3)	C15	C16	1.392(6)
S1	N1	1.659(3)	C2	C3	1.373(6)
S1	C15	1.759(4)	C20	C19	1.379(6)
O4	C22	1.324(4)	C5	C4	1.391(7)
O4	C23	1.453(6)	C9	C14	1.386(6)
O3	C22	1.194(4)	C9	C10	1.377(6)
N1	C1	1.414(5)	C19	C18	1.392(7)
N1	C8	1.480(4)	C23	C24	1.461(10)
O6	C25	1.321(5)	C16	C17	1.379(7)
O6	C26	1.480(7)	C3	C4	1.354(7)
O5	C25	1.195(5)	C3	F1	1.386(6)
C1	C6	1.387(5)	C14	C13	1.393(8)
C1	C2	1.382(5)	C18	C17	1.392(8)
C6	C7	1.506(6)	C18	C21	1.501(7)
C6	C5	1.388(6)	C10	C11	1.394(7)
C8	C22	1.534(5)	C13	C12	1.367(9)
C8	C7	1.600(5)	C11	C12	1.343(9)
C8	C25	1.542(5)	C26	C27	1.296(9)
C7	C9	1.519(5)			

Table S14 Bond Angles for **3i.**

Atom	Atom	Atom	Angle/˚	Atom	Atom	Atom	Angle/˚
O1	S1	O2	120.52(19)	C20	C15	S1	120.2(3)
O1	S1	N1	105.01(16)	C20	C15	C16	120.8(4)
O1	S1	C15	108.58(18)	C16	C15	S1	118.8(3)
O2	S1	N1	108.33(17)	C3	C2	C1	115.9(4)
O2	S1	C15	106.98(19)	C15	C20	C19	119.3(4)
N1	S1	C15	106.68(17)	O6	C25	C8	109.7(3)
C22	O4	C23	116.3(4)	O5	C25	O6	126.0(4)
C1	N1	S1	122.4(2)	O5	C25	C8	124.3(4)
C1	N1	C8	111.2(3)	C6	C5	C4	120.1(5)
C8	N1	S1	122.8(2)	C14	C9	C7	120.1(4)
C25	O6	C26	116.9(4)	C10	C9	C7	122.1(4)
C6	C1	N1	109.9(3)	C10	C9	C14	117.8(4)
C2	C1	N1	128.3(3)	C20	C19	C18	121.5(4)

Table S14 Bond Angles for **3i.**

Atom	Atom	Atom	Angle/°	Atom	Atom	Atom	Angle/°
C2	C1	C6	121.7(4)	O4	C23	C24	107.8(5)
C1	C6	C7	111.9(3)	C17	C16	C15	118.8(5)
C1	C6	C5	119.3(4)	C2	C3	F1	116.6(5)
C5	C6	C7	128.7(4)	C4	C3	C2	125.4(5)
N1	C8	C22	110.5(3)	C4	C3	F1	118.0(4)
N1	C8	C7	104.2(3)	C3	C4	C5	117.5(4)
N1	C8	C25	111.5(3)	C9	C14	C13	119.9(6)
C22	C8	C7	108.1(3)	C19	C18	C21	119.7(5)
C22	C8	C25	110.7(3)	C17	C18	C19	117.8(4)
C25	C8	C7	111.6(3)	C17	C18	C21	122.5(5)
O4	C22	C8	110.6(3)	C9	C10	C11	121.6(5)
O3	C22	O4	124.9(3)	C16	C17	C18	121.7(4)
O3	C22	C8	124.4(3)	C12	C13	C14	120.7(6)
C6	C7	C8	102.5(3)	C12	C11	C10	119.8(6)
C6	C7	C9	114.9(3)	C11	C12	C13	120.1(5)
C9	C7	C8	116.2(3)	C27	C26	O6	113.0(8)

Table S15 Torsion Angles for **3i.**

A	B	C	D	Angle/°	A	B	C	D	Angle/°
S1	N1	C1	C6	162.9(3)	C22	C8	C7	C6	121.8(3)
S1	N1	C1	C2	-19.7(5)	C22	C8	C7	C9	-112.0(3)
S1	N1	C8	C22	80.1(3)	C22	C8	C25	O6	-163.9(3)
S1	N1	C8	C7	-164.0(2)	C22	C8	C25	O5	17.0(5)
S1	N1	C8	C25	-43.5(4)	C7	C6	C5	C4	176.7(4)
S1	C15	C20	C19	175.9(3)	C7	C8	C22	O4	62.6(4)
S1	C15	C16	C17	-176.7(4)	C7	C8	C22	O3	-114.1(4)
O1	S1	N1	C1	-166.3(3)	C7	C8	C25	O6	75.7(4)
O1	S1	N1	C8	-9.6(3)	C7	C8	C25	O5	-103.4(5)
O1	S1	C15	C20	-35.6(4)	C7	C9	C14	C13	180.0(5)
O1	S1	C15	C16	139.2(4)	C7	C9	C10	C11	180.0(5)
O2	S1	N1	C1	-36.3(3)	C15	S1	N1	C1	78.5(3)
O2	S1	N1	C8	120.4(3)	C15	S1	N1	C8	-124.8(3)
O2	S1	C15	C20	-167.2(3)	C15	C20	C19	C18	0.6(7)
O2	S1	C15	C16	7.6(4)	C15	C16	C17	C18	1.0(8)
N1	S1	C15	C20	77.1(3)	C2	C1	C6	C7	-178.3(3)
N1	S1	C15	C16	-108.1(4)	C2	C1	C6	C5	-1.6(6)

Table S15 Torsion Angles for **3i.**

A	B	C	D	Angle/°	A	B	C	D	Angle/°
N1	C1	C6	C7	-0.8(4)	C2	C3	C4	C5	0.4(9)
N1	C1	C6	C5	176.0(3)	C20	C15	C16	C17	-2.0(7)
N1	C1	C2	C3	-175.2(4)	C20	C19	C18	C17	-1.5(8)
N1	C8	C22	O4	176.0(3)	C20	C19	C18	C21	179.6(5)
N1	C8	C22	O3	-0.6(5)	C25	O6	C26	C27	82.2(7)
N1	C8	C7	C6	4.2(3)	C25	C8	C22	O4	-59.9(4)
N1	C8	C7	C9	130.4(3)	C25	C8	C22	O3	123.4(4)
N1	C8	C25	O6	-40.4(4)	C25	C8	C7	C6	-116.2(3)
N1	C8	C25	O5	140.5(4)	C25	C8	C7	C9	10.0(4)
C1	N1	C8	C22	-120.9(3)	C5	C6	C7	C8	-178.6(4)
C1	N1	C8	C7	-5.0(3)	C5	C6	C7	C9	54.4(5)
C1	N1	C8	C25	115.5(3)	C9	C14	C13	C12	-1.9(10)
C1	C6	C7	C8	-2.3(4)	C9	C10	C11	C12	2.0(10)
C1	C6	C7	C9	-129.3(3)	C19	C18	C17	C16	0.7(8)
C1	C6	C5	C4	0.6(7)	C23	O4	C22	O3	-1.8(7)
C1	C2	C3	C4	-1.3(8)	C23	O4	C22	C8	-178.5(4)
C1	C2	C3	F1	178.9(4)	C16	C15	C20	C19	1.2(6)
C6	C1	C2	C3	1.9(6)	C14	C9	C10	C11	-1.1(8)
C6	C7	C9	C14	-150.6(4)	C14	C13	C12	C11	2.7(12)
C6	C7	C9	C10	28.3(6)	C10	C9	C14	C13	1.1(8)
C6	C5	C4	C3	0.0(8)	C10	C11	C12	C13	-2.8(11)
C8	N1	C1	C6	3.8(4)	C21	C18	C17	C16	179.6(6)
C8	N1	C1	C2	-178.8(4)	C26	O6	C25	O5	-14.3(7)
C8	C7	C9	C14	89.7(5)	C26	O6	C25	C8	166.6(4)
C8	C7	C9	C10	-91.4(5)	F1	C3	C4	C5	-179.8(5)
C22	O4	C23	C24	-173.8(6)					

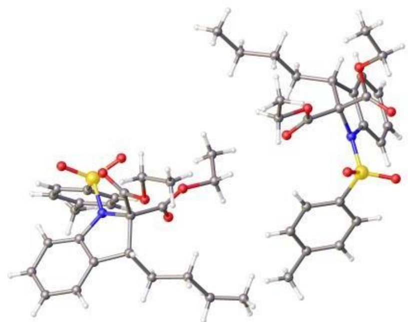
Table S16 Hydrogen Atom Coordinates (Å×10[4]) and Isotropic Displacement Parameters (Å[2]×10[3]) for **3i.**

Atom	*x*	*y*	*z*	U(eq)
H7	4071.14	4585.14	3478.44	72
H2	5469.65	8271.87	1267.06	83
H20	8644.34	5922.13	4634.23	79
H5	1597.73	6296.41	1583.97	99
H19	8669.69	7291.18	5340.08	92
H23A	5840.98	2984.48	6293.03	140
H23B	7796.75	2475.69	6355.26	140
H16	7934.88	8613.31	1682.51	97
H4	865.46	8406.17	500.78	113
H14	4380.59	2474.56	3850.52	114
H10	4516.86	4784.09	886.77	108
H17	7902.55	9979.93	2404.98	117
H13	4155.34	1084.39	3205.02	150
H24A	5708.6	1252.96	6143.41	250
H24B	6800.9	878.06	7208.45	250
H24C	7660.32	742.67	6234.46	250
H21A	7182.75	9960.22	4637.66	189
H21B	8539.02	10342.54	3938.72	189
H21C	9082.19	9232.37	5066.88	189
H11	4294.4	3376.33	267.1	139
H12	3991.89	1583.81	1413.67	141
H26A	9517.9	4134.11	766.81	140
H26B	10336	3195.88	1932.78	140
H27A	8797.87	2113.54	1862.68	250
H27B	10160.75	2188.77	1090.02	250
H27C	8283.36	2994.22	647.75	250

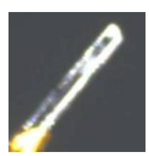
Structure Report for **3s**

Crystallographic data are presented in Tables S17-24. A single crystal of **3s** was coated in high- vacuum grease and mounted on a glass fibre. X-ray measurements were made using a Bruker D8 VENTURE PhtotonIII area-detector diffractometer with Cu-K_{α} radiation (α = 1.54 Å). Absorption corrections were applied, based on multiple and symmetry-equivalent measurements. The structure was solved by ShelXT structure solution program using Intrinsic Phasing and refined with the XL refinement package using Least Squares minimisation.

All non-hydrogen atoms were assigned anisotropic displacement parameters and refined without positional constraints and all other hydrogen atoms were constrained to ideal geometries and refined with fixed isotropic displacement parameters. Refinement proceeded smoothly to give the residuals shown in Table S18.



A colorless prism-like specimen of $C_{25}H_{31}NO_6S$, approximate dimensions 0.030 mm x 0.060 mm x 0.300 mm, was used for the X-ray crystallographic analysis. The X-ray intensity data were measured (λ = 1.54184 Å).



References

1. Sheldrick, G.M. (2015). Acta Cryst A71, 3-8; APEX3 Version 2016.7 (Bruker AXS Inc.) Bruker Instrument Service vV6.2.10
2. SAINT integration software, SAINT V8.38A (Bruker AXS Inc., 2017)
3. SADABS-2016/2 - Bruker AXS area detector scaling and absorption correction (Sheldrick, Bruker AXS Inc.)
4. *SHELXTL program system version 6.1;* XPREP Version 2013/3 (Sheldrick, Bruker AXS Inc.) XS Version 2013/1 (George M. Sheldrick, *Acta Cryst.* (2008). A**64**, 112-122)
5. *International Tables for Crystallography*, Kluwer, Dordrecht, 1992, vol. C.

Table S17: Data collection details for 3s.

Axis	dx/mm	2θ/°	ω/°	φ/°	χ/°	Width/°	Frames	Time/s	Wavelength/Å	Voltage/kV	Current/mA	Temperature/K
Phi	39.924	108.54	12.46	0.00	24.00	2.00	180	10.00	1.54184	50	1.1	220
Phi	39.924	93.54	91.60	0.00	-44.50	2.00	180	10.00	1.54184	50	1.1	220
Omega	39.924	108.54	-6.83	0.00	61.50	2.00	61	10.00	1.54184	50	1.1	220
Omega	39.924	108.54	-6.83	160.00	61.50	2.00	61	10.00	1.54184	50	1.1	220
Omega	39.924	-18.14	-124.02	180.00	44.50	2.00	54	10.00	1.54184	50	1.1	220
Omega	39.924	-48.14	-53.09	-156.00	-61.50	2.00	55	10.00	1.54184	50	1.1	220
Omega	39.924	-33.14	-132.81	270.00	44.50	2.00	51	10.00	1.54184	50	1.1	220
Omega	39.924	-48.14	-53.09	51.00	-61.50	2.00	55	10.00	1.54184	50	1.1	220
Phi	39.924	108.54	108.81	0.00	-24.00	2.00	180	10.00	1.54184	50	1.1	220
Omega	39.924	108.54	-6.83	-40.00	61.50	2.00	61	10.00	1.54184	50	1.1	220
Phi	39.924	78.54	76.60	0.00	-44.50	2.00	180	10.00	1.54184	50	1.1	220
Omega	39.924	108.54	-6.83	80.00	61.50	2.00	61	10.00	1.54184	50	1.1	220
Omega	39.924	108.54	-6.83	-120.00	61.50	2.00	61	10.00	1.54184	50	1.1	220
Omega	39.924	-33.14	-132.81	0.00	44.50	2.00	51	10.00	1.54184	50	1.1	220
Omega	39.924	108.54	-6.83	-80.00	61.50	2.00	61	10.00	1.54184	50	1.1	220
Omega	39.924	93.54	91.60	180.00	-44.50	2.00	42	10.00	1.54184	50	1.1	220
Omega	39.924	108.54	-6.83	-160.00	61.50	2.00	61	10.00	1.54184	50	1.1	220
Omega	39.924	108.54	-6.83	40.00	61.50	2.00	61	10.00	1.54184	50	1.1	220
Omega	39.924	-33.14	-132.81	90.00	44.50	2.00	51	10.00	1.54184	50	1.1	220
Omega	39.924	108.54	-6.83	120.00	61.50	2.00	61	10.00	1.54184	50	1.1	220
Omega	39.924	93.54	91.60	0.00	-44.50	2.00	42	10.00	1.54184	50	1.1	220
Omega	39.924	78.54	76.60	90.00	-44.50	2.00	49	10.00	1.54184	50	1.1	220
Omega	39.924	-18.14	-124.02	90.00	44.50	2.00	54	10.00	1.54184	50	1.1	220
Phi	39.924	108.54	106.60	0.00	-44.50	2.00	180	10.00	1.54184	50	1.1	220

A total of 1953 frames were collected. The total exposure time was 5.42 hours. The frames were integrated with the Bruker SAINT software package using a narrow-frame algorithm. The integration of the data using a triclinic unit cell yielded a total of 35331 reflections to a maximum θ angle of 72.13° (0.81 Å resolution), of which 8998 were independent (average redundancy 3.927, completeness = 97.9%, Rint = 5.87%, Rsig = 5.81%) and 8595 (95.52%) were greater than 2σ(F2). The final cell constants of a = 8.7444(9) Å, b = 9.5656(10) Å, c = 14.7103(15) Å, α = 93.632(4)°, β = 93.809(4)°, γ = 90.034(4)°, volume = 1225.3(2) Å3, are based upon the refinement of the XYZ-centroids of 9867 reflections above 20 σ(I) with 9.264° < 2θ < 144.4°. Data were corrected for absorption effects using the Multi-Scan method (SADABS). The ratio of minimum to maximum apparent transmission was 0.621. The calculated minimum and maximum transmission coefficients (based on crystal size) are 0.4524 and 0.7536.

The structure was solved and refined using the Bruker SHELXTL Software Package, with Z = 2 for the formula unit, $C_{25}H_{31}NO_6S$. The final anisotropic full-matrix least-squares refinement on F2 with 613 variables converged at R1 = 4.17%, for the observed data and wR2 = 11.39% for all data. The goodness-of-fit was 1.024.

The largest peak in the final difference electron density synthesis was 0.416 e-/Å3 and the largest hole was -0.318 e-/Å3 with an RMS deviation of 0.047 e-/Å3. On the basis of the final model, the calculated density was 1.284 g/cm3 and F(000), 504 e-.

Table S18 Crystal data and structure refinement for **3s.**

Identification code	**3s**
Empirical formula	$C_{25}H_{31}NO_6S$
Formula weight	473.57
Temperature/K	220.0
Crystal system	triclinic
Space group	P1
a/Å	8.7430(15)
b/Å	9.576(4)
c/Å	14.697(3)
α/°	93.60(2)
β/°	93.791(15)
γ/°	90.125(10)
Volume/Å^3	1225.3(6)
Z	2
ρ_{calc}g/cm^3	1.284
μ/mm^{-1}	1.507
F(000)	504.0
Crystal size/mm^3	0.3 × 0.06 × 0.03
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	9.254 to 133.948
Index ranges	$-10 \leq h \leq 10$, $-11 \leq k \leq 10$, $-17 \leq l \leq 17$
Reflections collected	31493
Independent reflections	8290 [R_{int} = 0.0569, R_{sigma} = 0.0521]
Data/restraints/parameters	8290/3/592
Goodness-of-fit on F^2	1.017
Final R indexes [I>=2σ (I)]	R_1 = 0.0509, wR_2 = 0.1380
Final R indexes [all data]	R_1 = 0.0528, wR_2 = 0.1412
Largest diff. peak/hole / e Å^{-3}	0.74/-0.66
Flack parameter	0.07(2)

Table S19 Fractional Atomic Coordinates (×10^4) and Equivalent Isotropic Displacement Parameters
(Å^2×10^3) for **3s**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	*x*	*y*	*z*	U(eq)
S1	5293.4(9)	2586.9(9)	1637.4(7)	29.8(2)
S2	3935.2(10)	7319.5(9)	8478.0(7)	31.6(3)
O2	5909(4)	3544(3)	2350(2)	42.2(7)
O8	3276(4)	8202(3)	7807(2)	41.9(7)
O1	5682(4)	2729(3)	717(2)	39.0(7)
O4	1996(4)	6193(3)	2059(2)	42.5(8)
O7	3619(4)	7567(4)	9416(2)	42.8(8)
O5	3449(4)	2823(4)	3643(2)	42.0(8)
O6	3500(4)	5163(3)	3573(2)	42.5(8)
O12	5581(4)	9593(4)	6561(2)	46.6(8)
O10	7267(4)	10841(3)	8014(2)	43.3(8)
O11	5589(5)	7252(4)	6444(2)	49.6(9)
O3	3793(5)	5304(4)	1186(3)	51.4(9)
N2	5794(4)	7375(4)	8367(2)	28.9(7)
O9	5496(5)	10143(4)	8922(3)	51.6(9)
N1	3417(4)	2644(3)	1711(2)	26.9(7)
C19	2901(5)	5188(4)	1760(3)	31.6(9)
C1	2354(4)	1944(4)	1064(3)	27.7(8)
C31	8355(5)	7139(4)	8759(3)	31.8(9)
C26	6895(5)	6759(4)	8977(3)	28.7(8)
C8	2650(5)	3799(4)	2215(3)	28.1(8)
C32	8299(5)	7999(4)	7937(3)	33.1(9)
C6	882(5)	2381(4)	1244(3)	29.1(8)
C16	3261(5)	3870(5)	3225(3)	33.1(9)
C27	6665(5)	5875(4)	9665(3)	32.9(9)
C33	6549(5)	8440(4)	7859(3)	28.9(8)
C2	2631(5)	944(4)	380(3)	30.9(8)
C44	5840(5)	8341(5)	6870(3)	34.1(9)
C9	5789(5)	866(5)	1905(3)	31.3(8)
C3	1363(5)	344(5)	-127(3)	38.5(10)
C7	891(5)	3363(4)	2083(3)	31.2(9)
C41	6360(5)	9902(4)	8333(3)	32.4(9)
C28	7951(6)	5347(5)	10121(3)	40.8(10)
C5	-364(5)	1794(5)	718(3)	39.7(10)

Table S19 Fractional Atomic Coordinates (×10^4) and Equivalent Isotropic Displacement Parameters
(Å^2×10^3) for **3s**. U_{eq} is defined as 1/3 of of the trace of the orthogonalised U_{IJ} tensor.

Atom	*x*	*y*	*z*	U(eq)
C22	220(6)	2599(6)	2861(4)	43.7(11)
C35	3047(6)	4666(5)	8808(4)	42.9(10)
C14	5766(7)	496(6)	2797(4)	53.6(14)
C47	8930(6)	7149(5)	7114(3)	41.5(11)
C12	6828(6)	-1771(5)	2349(4)	45.3(11)
C34	3400(5)	5568(5)	8155(3)	34.2(9)
C20	2249(7)	7584(5)	1706(4)	48.7(13)
C4	-111(6)	774(5)	41(4)	45.0(11)
C39	3229(7)	5142(6)	7234(4)	50.0(12)
C37	2363(6)	2862(6)	7636(4)	49.3(12)
C10	6308(6)	-60(5)	1241(3)	40.5(10)
C30	9626(5)	6628(5)	9240(4)	42.0(10)
C13	6288(8)	-828(6)	3015(4)	60.3(15)
C29	9415(6)	5716(6)	9916(4)	46.5(11)
C11	6827(7)	-1360(6)	1478(4)	49.3(12)
C48	9325(7)	8025(6)	6326(4)	53.2(13)
C36	2527(7)	3345(6)	8536(4)	51.2(12)
C38	2701(8)	3813(6)	6990(4)	58.7(14)
C23	-197(7)	3544(7)	3680(4)	59.6(15)
C42	7045(9)	12303(6)	8361(4)	58.5(15)
C17	4015(7)	5284(7)	4549(3)	55.7(14)
C49	9960(15)	7088(13)	5557(6)	112(2)
C15	7383(9)	-3192(6)	2579(5)	67.5(17)
C40	1806(9)	1409(6)	7349(5)	67.3(17)
C18	5654(9)	4977(9)	4705(5)	73.2(19)
C45	4901(10)	9582(9)	5624(4)	79(2)
C50	10408(17)	7914(19)	4750(8)	143(4)
C46	4882(17)	11028(13)	5365(6)	131(5)
C43	7689(19)	13206(8)	7736(9)	135(5)
C21	1446(15)	8616(8)	2243(7)	110(4)
C24	-622(15)	2700(13)	4475(6)	112(2)
C25	-769(17)	3114(19)	5371(8)	143(4)

Table S20 Anisotropic Displacement Parameters ($Å^2 \times 10^3$) for **3s.** The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+\ldots]$.

Atom	**U_{11}**	**U_{22}**	**U_{33}**	**U_{23}**	**U_{13}**	**U_{12}**
S1	26.3(5)	25.6(5)	37.3(5)	-0.1(4)	3.9(4)	-0.2(3)
S2	27.2(5)	27.3(5)	40.4(5)	0.7(4)	3.1(4)	5.3(4)
O2	35.7(16)	32.1(17)	57(2)	-10.1(14)	-2.0(14)	-3.5(12)
O8	36.9(16)	33.5(17)	55.2(19)	7.2(14)	-1.8(14)	8.9(13)
O1	39.7(17)	39.0(18)	40.6(17)	8.3(13)	14.1(13)	1.8(13)
O4	56(2)	25.5(16)	47.8(18)	7.5(13)	12.5(15)	8.8(14)
O7	37.7(17)	44.5(19)	46.6(18)	-6.7(14)	14.1(14)	2.9(14)
O5	54(2)	36.4(18)	35.6(17)	5.5(13)	-0.1(14)	4.8(14)
O6	58(2)	33.3(18)	34.0(16)	-7.5(12)	-1.8(14)	3.5(14)
O12	64(2)	45(2)	29.8(15)	7.5(13)	-5.1(14)	8.3(16)
O10	63(2)	22.6(16)	45.0(18)	-2.3(13)	13.0(15)	-2.9(14)
O11	64(2)	44(2)	38.8(18)	-12.3(15)	2.0(16)	-6.1(17)
O3	71(2)	36.2(18)	51(2)	11.4(15)	27.2(18)	9.9(16)
N2	30.2(18)	24.7(18)	32.3(17)	4.0(13)	3.2(14)	3.1(13)
O9	68(2)	36.0(19)	51(2)	-11.1(15)	21.5(18)	0.6(16)
N1	26.2(17)	24.0(18)	30.1(17)	-3.7(13)	4.0(13)	2.2(13)
C19	42(2)	22(2)	30(2)	0.3(15)	1.6(17)	2.4(16)
C1	29.6(19)	25(2)	28.5(19)	4.3(15)	1.6(15)	0.9(15)
C31	30(2)	22(2)	43(2)	-1.3(16)	2.2(17)	0.9(15)
C26	30.0(19)	22.2(19)	33.1(19)	-3.1(15)	0.6(15)	3.7(15)
C8	34(2)	23(2)	27.8(19)	-0.1(15)	5.5(16)	4.9(15)
C32	35(2)	23(2)	42(2)	-2.3(16)	7.5(17)	-0.7(16)
C6	31(2)	23(2)	33(2)	2.0(16)	1.7(16)	3.5(15)
C16	41(2)	27(2)	31(2)	-1.7(16)	3.4(16)	5.6(17)
C27	35(2)	27(2)	37(2)	2.5(16)	4.5(17)	0.6(16)
C33	36(2)	23(2)	28.1(19)	0.8(15)	1.8(16)	2.6(16)
C2	32(2)	26(2)	34(2)	-1.7(16)	3.5(16)	5.0(16)
C44	41(2)	36(2)	25.5(19)	-2.1(16)	2.7(16)	-0.2(18)
C9	30(2)	31(2)	33(2)	0.5(16)	-1.4(15)	0.5(16)
C3	43(2)	33(2)	38(2)	-3.9(18)	-1.2(19)	-0.1(18)
C7	29(2)	27(2)	38(2)	-1.3(16)	5.8(16)	7.3(16)
C41	41(2)	27(2)	29.0(19)	1.5(15)	0.3(17)	1.4(17)
C28	53(3)	31(2)	39(2)	7.8(17)	1(2)	3.1(19)
C5	30(2)	40(3)	49(3)	-1(2)	-1.1(18)	4.0(18)
C22	41(3)	46(3)	45(3)	2(2)	13(2)	-2(2)
C35	42(2)	43(3)	43(2)	7(2)	2.4(19)	-6(2)
C14	74(4)	50(3)	37(2)	6(2)	8(2)	24(3)
C47	42(2)	38(3)	45(3)	1.3(19)	14(2)	6(2)
C12	51(3)	31(2)	54(3)	4(2)	-6(2)	2(2)
C34	26(2)	34(2)	43(2)	3.5(18)	0.8(17)	0.7(16)
C20	69(3)	22(2)	56(3)	8(2)	5(3)	4(2)
C4	40(2)	40(3)	52(3)	-6(2)	-9(2)	-3(2)
C39	66(3)	40(3)	43(3)	4(2)	-1(2)	-12(2)

Table S20 Anisotropic Displacement Parameters ($Å^2 \times 10^3$) for **3s.** The Anisotropic displacement factor exponent takes the form: $-2\pi^2[h^2a^{*2}U_{11}+2hka^*b^*U_{12}+…]$.

Atom	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
C37	44(3)	37(3)	66(3)	2(2)	0(2)	-2(2)
C10	46(3)	35(2)	39(2)	-3.9(18)	1.3(19)	7(2)
C30	30(2)	40(3)	56(3)	6(2)	-1.1(19)	-0.7(18)
C13	87(4)	52(3)	44(3)	11(2)	11(3)	24(3)
C29	39(2)	47(3)	54(3)	15(2)	-5(2)	7(2)
C11	61(3)	37(3)	48(3)	-9(2)	1(2)	11(2)
C48	55(3)	54(3)	52(3)	4(2)	16(2)	-6(2)
C36	60(3)	39(3)	56(3)	13(2)	3(2)	-6(2)
C38	81(4)	44(3)	50(3)	-1(2)	1(3)	-17(3)
C23	52(3)	78(4)	51(3)	-6(3)	21(2)	7(3)
C42	92(5)	26(3)	59(3)	-4(2)	17(3)	2(3)
C17	75(4)	60(3)	30(2)	-17(2)	-1(2)	10(3)
C49	143(6)	130(6)	68(3)	-2(3)	56(4)	3(4)
C15	91(5)	35(3)	75(4)	2(3)	-4(4)	13(3)
C40	84(4)	37(3)	81(4)	1(3)	6(3)	-11(3)
C18	71(4)	90(5)	53(3)	-22(3)	-14(3)	6(4)
C45	101(5)	103(6)	32(3)	15(3)	-16(3)	19(4)
C50	136(7)	217(11)	81(4)	23(6)	33(4)	23(7)
C46	198(13)	138(9)	64(5)	54(6)	7(6)	77(9)
C43	243(15)	33(4)	140(9)	-1(5)	94(10)	-14(6)
C21	186(10)	36(4)	122(7)	21(4)	92(7)	25(5)
C24	143(6)	130(6)	68(3)	-2(3)	56(4)	3(4)
C25	136(7)	217(11)	81(4)	23(6)	33(4)	23(7)

Table S21 Bond Lengths for **3s.**

Atom	Atom	Length/Å	Atom	Atom	Length/Å
S1	O2	1.424(3)	C6	C7	1.503(6)
S1	O1	1.431(3)	C6	C5	1.391(6)
S1	N1	1.652(3)	C27	C28	1.384(7)
S1	C9	1.766(4)	C33	C44	1.539(6)
S2	O8	1.431(3)	C33	C41	1.539(6)
S2	O7	1.429(4)	C2	C3	1.396(6)
S2	N2	1.645(4)	C9	C14	1.381(7)
S2	C34	1.768(5)	C9	C10	1.377(6)
O4	C19	1.320(5)	C3	C4	1.386(7)
O4	C20	1.481(6)	C7	C22	1.542(6)
O5	C16	1.215(6)	C28	C29	1.384(7)
O6	C16	1.321(6)	C5	C4	1.379(7)
O6	C17	1.471(6)	C22	C23	1.525(7)

Table S21 Bond Lengths for **3s.**

Atom	Atom	Length/Å	Atom	Atom	Length/Å
O12	C44	1.323(6)	C35	C34	1.380(7)
O12	C45	1.463(7)	C35	C36	1.369(8)
O10	C41	1.325(6)	C14	C13	1.398(8)
O10	C42	1.478(6)	C47	C48	1.530(7)
O11	C44	1.195(6)	C12	C13	1.396(8)
O3	C19	1.196(6)	C12	C11	1.362(8)
N2	C26	1.426(5)	C12	C15	1.496(7)
N2	C33	1.480(5)	C34	C39	1.387(7)
O9	C41	1.198(6)	C20	C21	1.439(9)
N1	C1	1.420(5)	C39	C38	1.372(8)
N1	C8	1.479(5)	C37	C36	1.371(8)
C19	C8	1.547(6)	C37	C38	1.401(8)
C1	C6	1.391(6)	C37	C40	1.499(8)
C1	C2	1.377(6)	C10	C11	1.384(7)
C31	C26	1.390(6)	C30	C29	1.384(7)
C31	C32	1.503(6)	C48	C49	1.533(11)
C31	C30	1.384(6)	C23	C24	1.527(11)
C26	C27	1.382(6)	C42	C43	1.440(11)
C8	C16	1.540(6)	C17	C18	1.470(9)
C8	C7	1.589(6)	C49	C50	1.538(15)
C32	C33	1.587(6)	C45	C46	1.459(14)
C32	C47	1.548(6)	C24	C25	1.365(14)

Table S22 Bond Angles for **3s.**

Atom	Atom	Atom	Angle/˚	Atom	Atom	Atom	Angle/˚
O2	S1	O1	119.9(2)	N2	C33	C44	107.9(3)
O2	S1	N1	105.20(18)	N2	C33	C41	110.1(3)
O2	S1	C9	109.1(2)	C44	C33	C32	113.2(3)
O1	S1	N1	110.84(19)	C41	C33	C32	109.9(3)
O1	S1	C9	106.6(2)	C41	C33	C44	112.3(3)
N1	S1	C9	104.18(18)	C1	C2	C3	117.4(4)
O8	S2	N2	105.34(19)	O12	C44	C33	111.7(4)
O8	S2	C34	108.6(2)	O11	C44	O12	125.3(4)
O7	S2	O8	120.0(2)	O11	C44	C33	122.9(4)
O7	S2	N2	110.32(19)	C14	C9	S1	119.4(4)
O7	S2	C34	107.0(2)	C10	C9	S1	119.9(3)
N2	S2	C34	104.63(19)	C10	C9	C14	120.5(4)
C19	O4	C20	115.5(4)	C4	C3	C2	120.8(4)

Table S22 Bond Angles for **3s.**

Atom	Atom	Atom	Angle/°	Atom	Atom	Atom	Angle/°
C16	O6	C17	115.0(4)	C6	C7	C8	101.4(3)
C44	O12	C45	114.9(5)	C6	C7	C22	109.0(4)
C41	O10	C42	115.5(4)	C22	C7	C8	117.0(4)
C26	N2	S2	123.4(3)	O10	C41	C33	111.8(3)
C26	N2	C33	109.8(3)	O9	C41	O10	124.9(4)
C33	N2	S2	123.5(3)	O9	C41	C33	123.3(4)
C1	N1	S1	123.5(3)	C27	C28	C29	121.5(4)
C1	N1	C8	110.1(3)	C4	C5	C6	119.1(4)
C8	N1	S1	122.7(3)	C23	C22	C7	115.0(5)
O4	C19	C8	112.4(3)	C36	C35	C34	119.2(5)
O3	C19	O4	124.8(4)	C9	C14	C13	118.9(5)
O3	C19	C8	122.8(4)	C48	C47	C32	114.5(4)
C6	C1	N1	108.7(3)	C13	C12	C15	121.3(5)
C2	C1	N1	128.7(4)	C11	C12	C13	117.8(5)
C2	C1	C6	122.5(4)	C11	C12	C15	120.9(5)
C26	C31	C32	111.6(4)	C35	C34	S2	120.3(4)
C30	C31	C26	119.6(4)	C35	C34	C39	120.4(5)
C30	C31	C32	128.6(4)	C39	C34	S2	119.2(4)
C31	C26	N2	108.8(4)	C21	C20	O4	108.7(5)
C27	C26	N2	129.3(4)	C5	C4	C3	121.0(4)
C27	C26	C31	121.9(4)	C38	C39	C34	118.6(5)
N1	C8	C19	109.8(3)	C36	C37	C38	116.5(5)
N1	C8	C16	109.2(3)	C36	C37	C40	122.3(6)
N1	C8	C7	103.0(3)	C38	C37	C40	121.2(6)
C19	C8	C7	109.6(3)	C9	C10	C11	119.3(5)
C16	C8	C19	112.3(3)	C31	C30	C29	119.1(4)
C16	C8	C7	112.5(3)	C12	C13	C14	121.1(5)
C31	C32	C33	101.6(3)	C28	C29	C30	120.3(4)
C31	C32	C47	110.2(4)	C12	C11	C10	122.3(5)
C47	C32	C33	117.8(4)	C47	C48	C49	110.2(6)
C1	C6	C7	111.6(4)	C35	C36	C37	122.9(5)
C5	C6	C1	119.2(4)	C39	C38	C37	122.5(6)
C5	C6	C7	128.8(4)	C22	C23	C24	111.8(6)
O5	C16	O6	125.1(4)	C43	C42	O10	107.8(5)
O5	C16	C8	121.8(4)	C18	C17	O6	112.4(5)
O6	C16	C8	113.1(3)	C48	C49	C50	112.7(10)
C26	C27	C28	117.5(4)	C46	C45	O12	107.0(7)
N2	C33	C32	103.1(3)	C25	C24	C23	130.2(12)

Table S23 Torsion Angles for **3s.**

A	B	C	D	Angle/°	A	B	C	D	Angle/°
S1	N1	C1	C6	-170.7(3)	C26	C27	C28	C29	1.7(7)
S1	N1	C1	C2	11.9(6)	C8	N1	C1	C6	-12.1(4)
S1	N1	C8	C19	63.6(4)	C8	N1	C1	C2	170.5(4)
S1	N1	C8	C16	-60.0(4)	C8	C7	C22	C23	79.6(5)
S1	N1	C8	C7	-179.8(3)	C32	C31	C26	N2	-2.8(5)
S1	C9	C14	C13	-174.5(5)	C32	C31	C26	C27	174.9(4)
S1	C9	C10	C11	174.0(4)	C32	C31	C30	C29	-172.4(5)
S2	N2	C26	C31	-172.7(3)	C32	C33	C44	O12	-108.7(4)
S2	N2	C26	C27	9.8(6)	C32	C33	C44	O11	70.1(6)
S2	N2	C33	C32	-178.4(3)	C32	C33	C41	O10	54.5(4)
S2	N2	C33	C44	-58.4(4)	C32	C33	C41	O9	-125.2(5)
S2	N2	C33	C41	64.4(4)	C32	C47	C48	C49	179.1(7)
S2	C34	C39	C38	-175.1(5)	C6	C1	C2	C3	-1.4(6)
O2	S1	N1	C1	173.5(3)	C6	C7	C22	C23	-166.2(4)
O2	S1	N1	C8	17.5(4)	C6	C5	C4	C3	-0.8(8)
O2	S1	C9	C14	39.1(5)	C16	O6	C17	C18	78.5(7)
O2	S1	C9	C10	-135.8(4)	C16	C8	C7	C6	-139.1(3)
O8	S2	N2	C26	172.8(3)	C16	C8	C7	C22	-20.7(5)
O8	S2	N2	C33	15.3(4)	C27	C28	C29	C30	-0.2(8)
O8	S2	C34	C35	-141.7(4)	C33	N2	C26	C31	-12.6(4)
O8	S2	C34	C39	33.6(4)	C33	N2	C26	C27	169.9(4)
O1	S1	N1	C1	42.5(4)	C33	C32	C47	C48	79.6(5)
O1	S1	N1	C8	-113.5(3)	C2	C1	C6	C7	174.0(4)
O1	S1	C9	C14	169.9(4)	C2	C1	C6	C5	0.0(6)
O1	S1	C9	C10	-5.0(4)	C2	C3	C4	C5	-0.6(8)
O4	C19	C8	N1	167.0(4)	C44	O12	C45	C46	-172.9(7)
O4	C19	C8	C16	-71.3(5)	C44	C33	C41	O10	-72.4(5)
O4	C19	C8	C7	54.6(4)	C44	C33	C41	O9	107.9(5)
O7	S2	N2	C26	41.9(4)	C9	S1	N1	C1	-71.7(3)
O7	S2	N2	C33	-115.6(3)	C9	S1	N1	C8	132.2(3)
O7	S2	C34	C35	-10.8(4)	C9	C14	C13	C12	0.1(10)
O7	S2	C34	C39	164.4(4)	C9	C10	C11	C12	0.8(8)
O3	C19	C8	N1	-11.1(6)	C7	C8	C16	O5	70.6(5)
O3	C19	C8	C16	110.6(5)	C7	C8	C16	O6	-107.4(4)
O3	C19	C8	C7	-123.5(5)	C7	C6	C5	C4	-171.7(5)
N2	S2	C34	C35	106.2(4)	C7	C22	C23	C24	-171.4(7)
N2	S2	C34	C39	-78.5(4)	C41	O10	C42	C43	-160.2(8)

Table S23 Torsion Angles for **3s.**

A	B	C	D	Angle/°	A	B	C	D	Angle/°
N2	C26	C27	C28	175.7(4)	C41	C33	C44	O12	16.4(5)
N2	C33	C44	O12	137.8(4)	C41	C33	C44	O11	-164.8(4)
N2	C33	C44	O11	-43.4(6)	C5	C6	C7	C8	-170.7(4)
N2	C33	C41	O10	167.4(3)	C5	C6	C7	C22	65.3(6)
N2	C33	C41	O9	-12.3(6)	C22	C23	C24	C25	165.6(13)
N1	S1	C9	C14	-72.9(4)	C35	C34	C39	C38	0.1(8)
N1	S1	C9	C10	112.2(4)	C14	C9	C10	C11	-0.9(7)
N1	C1	C6	C7	-3.5(5)	C47	C32	C33	N2	99.1(4)
N1	C1	C6	C5	-177.5(4)	C47	C32	C33	C44	-17.2(5)
N1	C1	C2	C3	175.6(4)	C47	C32	C33	C41	-143.6(4)
N1	C8	C16	O5	-43.1(6)	C47	C48	C49	C50	-178.9(9)
N1	C8	C16	O6	138.8(4)	C34	S2	N2	C26	-72.8(4)
N1	C8	C7	C6	-21.6(4)	C34	S2	N2	C33	129.7(3)
N1	C8	C7	C22	96.8(4)	C34	C35	C36	C37	1.1(8)
C19	O4	C20	C21	-166.8(7)	C34	C39	C38	C37	-1.5(10)
C19	C8	C16	O5	-165.1(4)	C20	O4	C19	O3	-6.3(7)
C19	C8	C16	O6	16.8(5)	C20	O4	C19	C8	175.6(4)
C19	C8	C7	C6	95.2(4)	C10	C9	C14	C13	0.4(9)
C19	C8	C7	C22	-146.5(4)	C30	C31	C26	N2	-177.9(4)
C1	N1	C8	C19	-95.3(4)	C30	C31	C26	C27	-0.1(6)
C1	N1	C8	C16	141.2(3)	C30	C31	C32	C33	-170.1(4)
C1	N1	C8	C7	21.4(4)	C30	C31	C32	C47	64.3(6)
C1	C6	C7	C8	16.0(4)	C13	C12	C11	C10	-0.3(9)
C1	C6	C7	C22	-108.0(4)	C11	C12	C13	C14	-0.2(10)
C1	C6	C5	C4	1.1(7)	C36	C35	C34	S2	175.2(4)
C1	C2	C3	C4	1.7(7)	C36	C35	C34	C39	0.1(7)
C31	C26	C27	C28	-1.5(6)	C36	C37	C38	C39	2.5(9)
C31	C32	C33	N2	-21.4(4)	C38	C37	C36	C35	-2.3(9)
C31	C32	C33	C44	-137.7(4)	C42	O10	C41	O9	-6.5(7)
C31	C32	C33	C41	96.0(4)	C42	O10	C41	C33	173.8(4)
C31	C32	C47	C48	-164.6(4)	C17	O6	C16	O5	-0.7(7)
C31	C30	C29	C28	-1.6(8)	C17	O6	C16	C8	177.3(4)
C26	N2	C33	C32	21.4(4)	C15	C12	C13	C14	-179.8(7)
C26	N2	C33	C44	141.4(3)	C15	C12	C11	C10	179.4(6)
C26	N2	C33	C41	-95.8(4)	C40	C37	C36	C35	179.4(6)
C26	C31	C32	C33	15.4(4)	C40	C37	C38	C39	-179.2(6)
C26	C31	C32	C47	-110.2(4)	C45	O12	C44	O11	1.4(8)
C26	C31	C30	C29	1.7(7)	C45	O12	C44	C33	-179.8(5)

Table S24 Hydrogen Atom Coordinates (Å×10^4) and Isotropic Displacement Parameters (Å^2×10^3) for **3s.**

Atom	*x*	*y*	*z*	U(eq)
H32	8939.72	8847.93	8080.12	40
H27	5672.79	5642.07	9817.05	39
H2	3635.55	676.9	259.72	37
H3	1509.97	-358.9	-587.89	46
H7	263.45	4194.74	1951.2	37
H28	7827.53	4724.01	10580.77	49
H5	-1366.33	2087.86	822.57	48
H22A	-701.71	2086.57	2612.96	52
H22B	967.35	1909.89	3072.36	52
H35	3161.74	4954.09	9431.92	51
H14	5405.87	1124.86	3250.42	64
H47A	9854.33	6657.24	7328.52	50
H47B	8167.26	6440.5	6883.26	50
H20A	3347.14	7805.37	1745.84	58
H20B	1867.99	7581.71	1063.19	58
H4	-949.44	363.13	-311.34	54
H39	3470.19	5752.07	6786.45	60
H10	6309.02	188.8	632.07	49
H30	10618.29	6897.71	9110.41	50
H13	6274.19	-1088.99	3620.67	72
H29	10269.88	5344.23	10237.01	56
H11	7191.35	-1982.1	1022.8	59
H48A	10088.41	8739.61	6546.03	64
H48B	8403.42	8501.58	6090.95	64
H36	2272.29	2744.23	8985.04	61
H38	2561.79	3528.42	6366.5	70
H23A	-1062.91	4135.04	3497.39	72
H23B	675.38	4158.13	3880.3	72
H42A	5950.29	12495.32	8401.65	70
H42B	7558.86	12464.58	8971.97	70
H17A	3818.78	6235.64	4797.33	67
H17B	3418.68	4635.42	4876.71	67
H49A	9185.48	6383.41	5336.08	134
H49B	10862.98	6595.12	5801.41	134

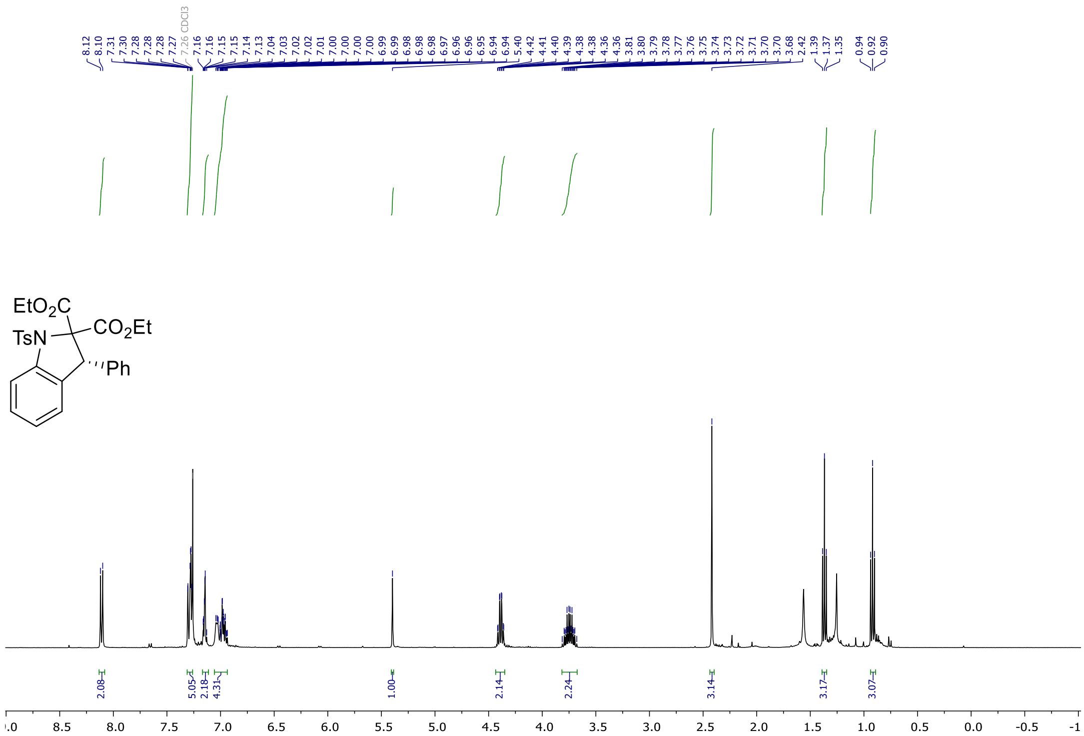
Table S24 Hydrogen Atom Coordinates (Å×10^4) and Isotropic Displacement Parameters (Å^2×10^3) for **3s.**

Atom	***x***	***y***	***z***	**U(eq)**
H15A	7675.91	-3184.69	3227.86	101
H15B	8262.2	-3436.79	2234.17	101
H15C	6570.46	-3873.9	2425.51	101
H40A	2612.73	744.89	7486.1	101
H40B	1530.6	1343.76	6697.17	101
H40C	916.07	1196.95	7676.91	101
H18A	5851.32	4028.4	4472.49	110
H18B	5941.63	5071.07	5355.01	110
H18C	6251.6	5627.91	4391.2	110
H45A	5510.85	9002.44	5212.63	95
H45B	3856.23	9200.73	5590.87	95
H50A	10931.45	7300.72	4322.88	215
H50B	11084.03	8682.78	4974.19	215
H50C	9492.72	8281.34	4443.12	215
H46A	4268.08	11089.72	4794.67	197
H46B	5920.94	11335.21	5288.68	197
H46C	4443.81	11620.52	5839.19	197
H43A	7162.62	13047.51	7135.86	203
H43B	8769.89	13002.9	7697.47	203
H43C	7567	14174.18	7952.43	203
H21A	1494.33	9511.54	1971.75	166
H21B	1919.06	8700.89	2860.03	166
H21C	383.14	8331.62	2259.61	166
H24A	-1608.3	2260.18	4268.93	134
H24B	122.75	1937.5	4490.79	134
H25A	-1599.08	3779.87	5415.12	215
H25B	179.37	3550.29	5627.02	215
H25C	-990.71	2305.73	5707.18	215

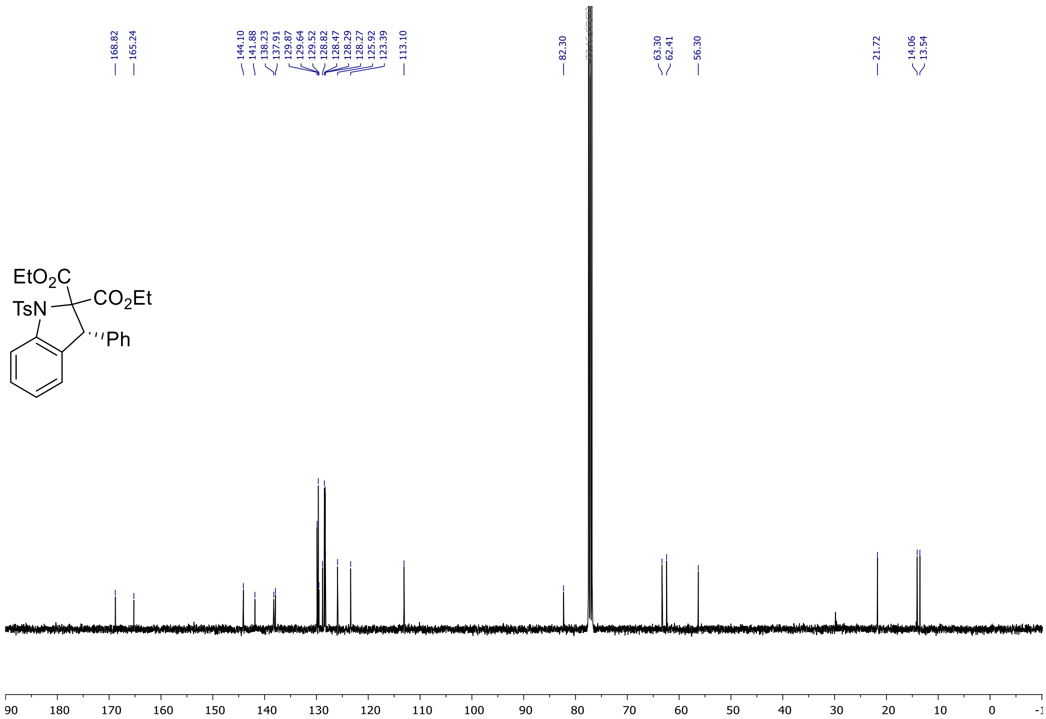
6. Copies of NMR spectra

Diethyl (*R*)-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3a)

^{1}H NMR (400 MHz, $CDCl_3$)

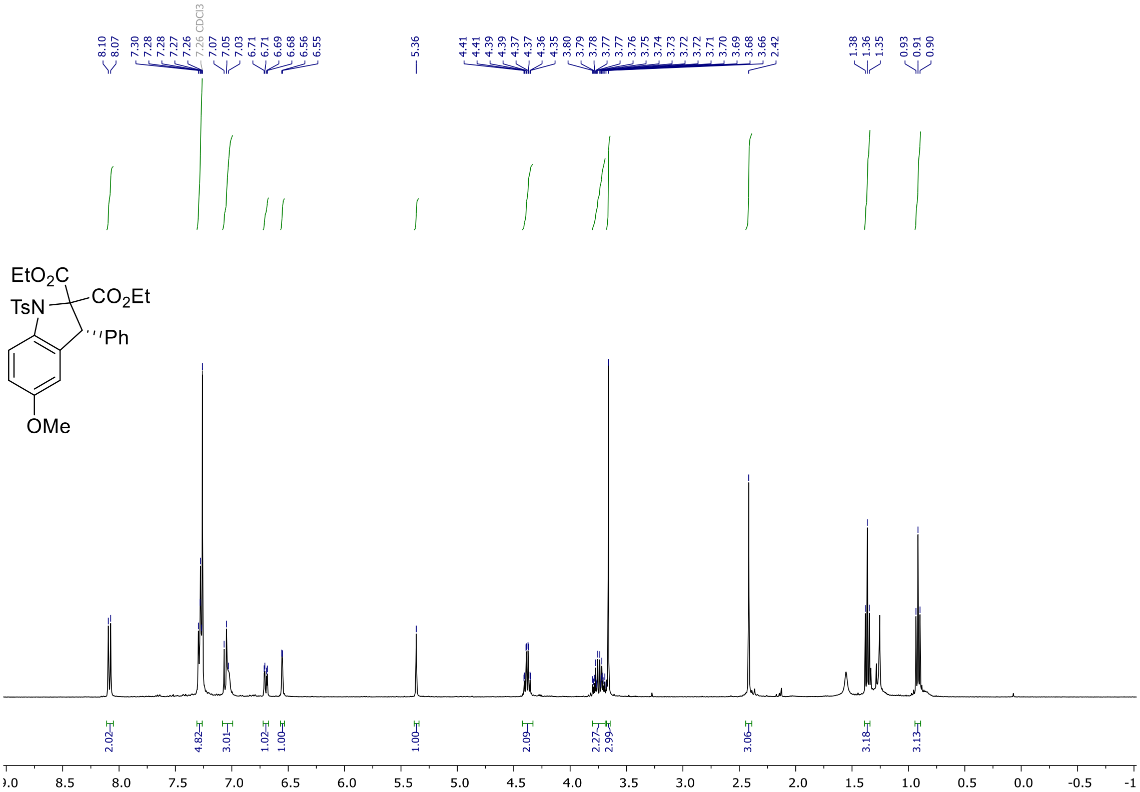


^{13}C NMR (101 MHz, $CDCl_3$)

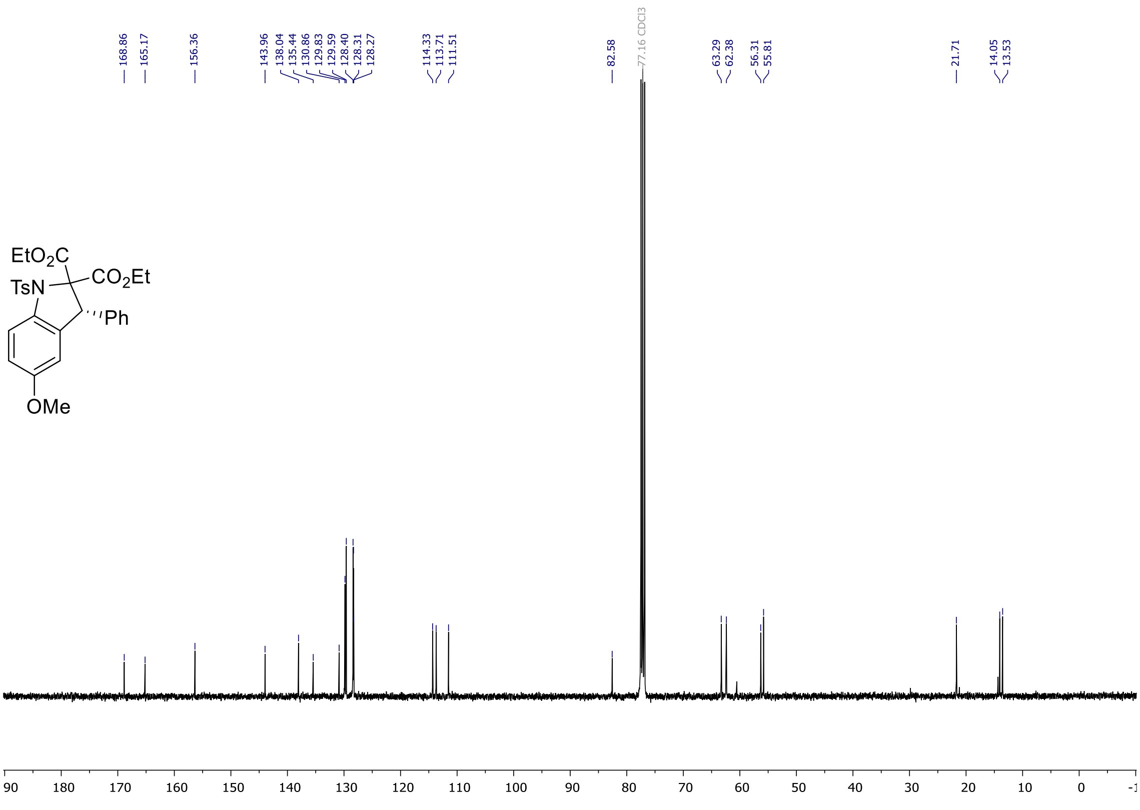


Diethyl (*R*)-5-methoxy-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3b)

^{1}H NMR (400 MHz, $CDCl_3$)

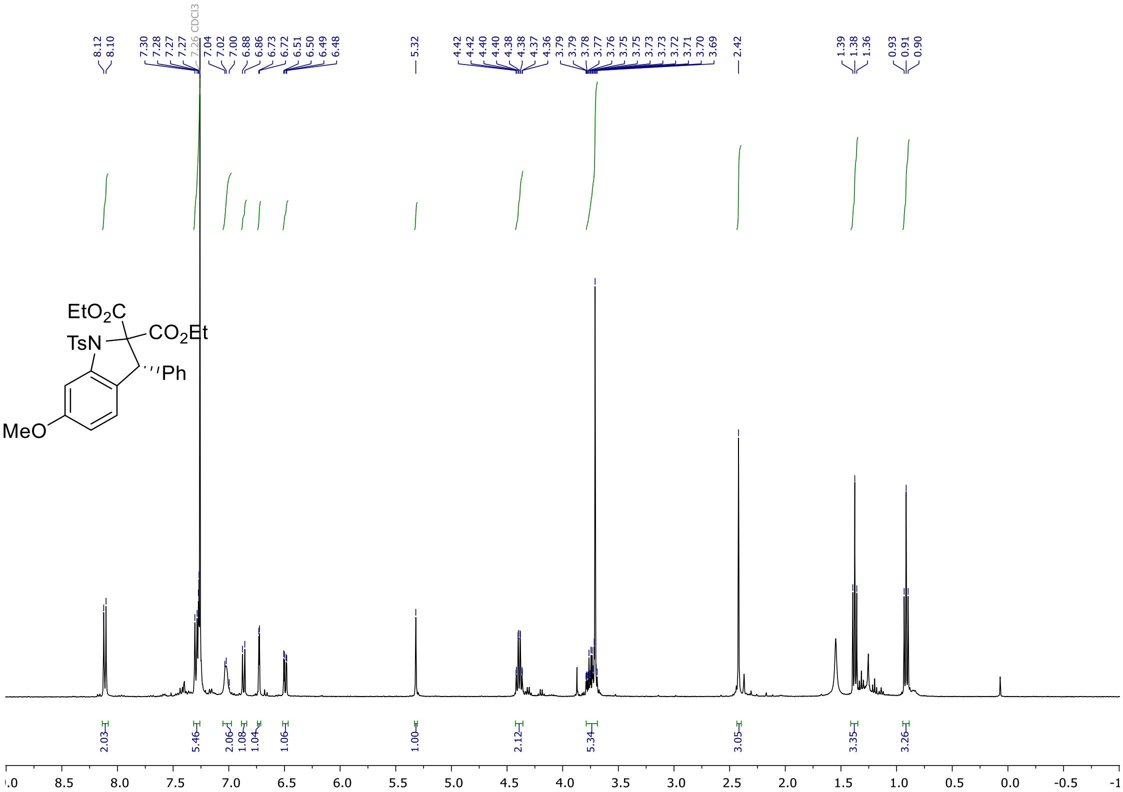


^{13}C NMR (101 MHz, $CDCl_3$)

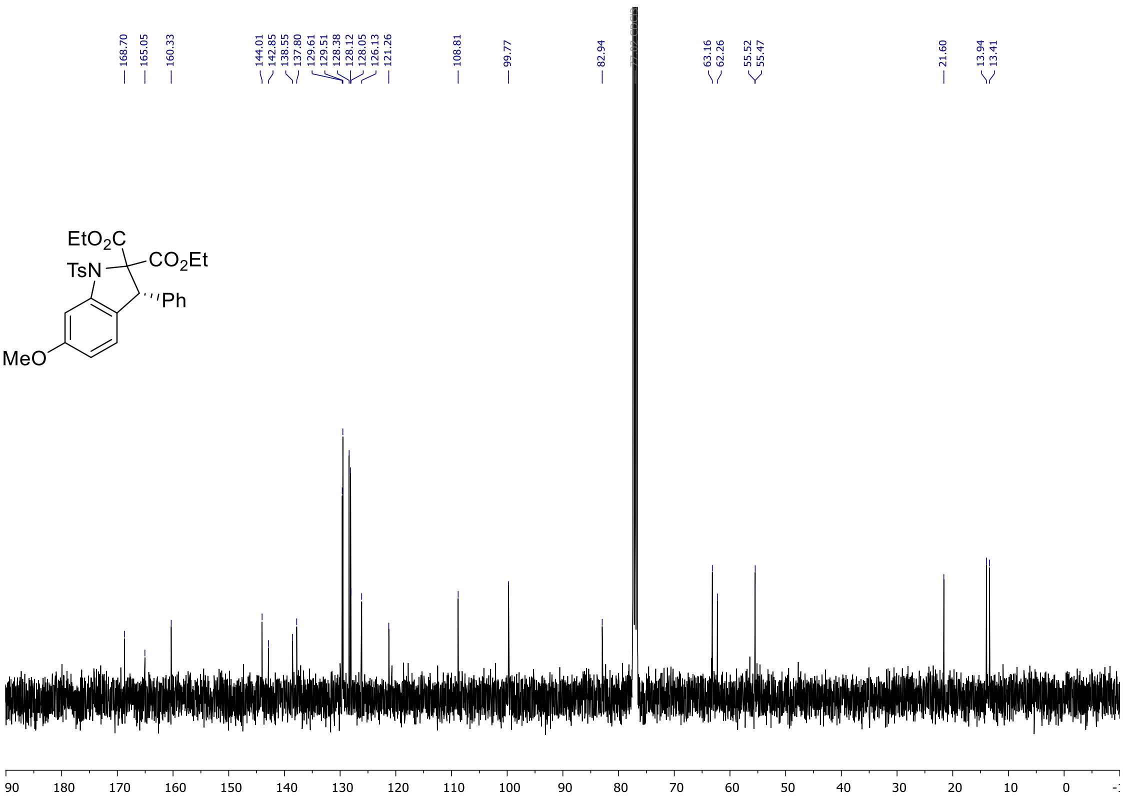


Diethyl (*R*)-6-methoxy-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3c)

^{1}H NMR (400 MHz, $CDCl_3$)

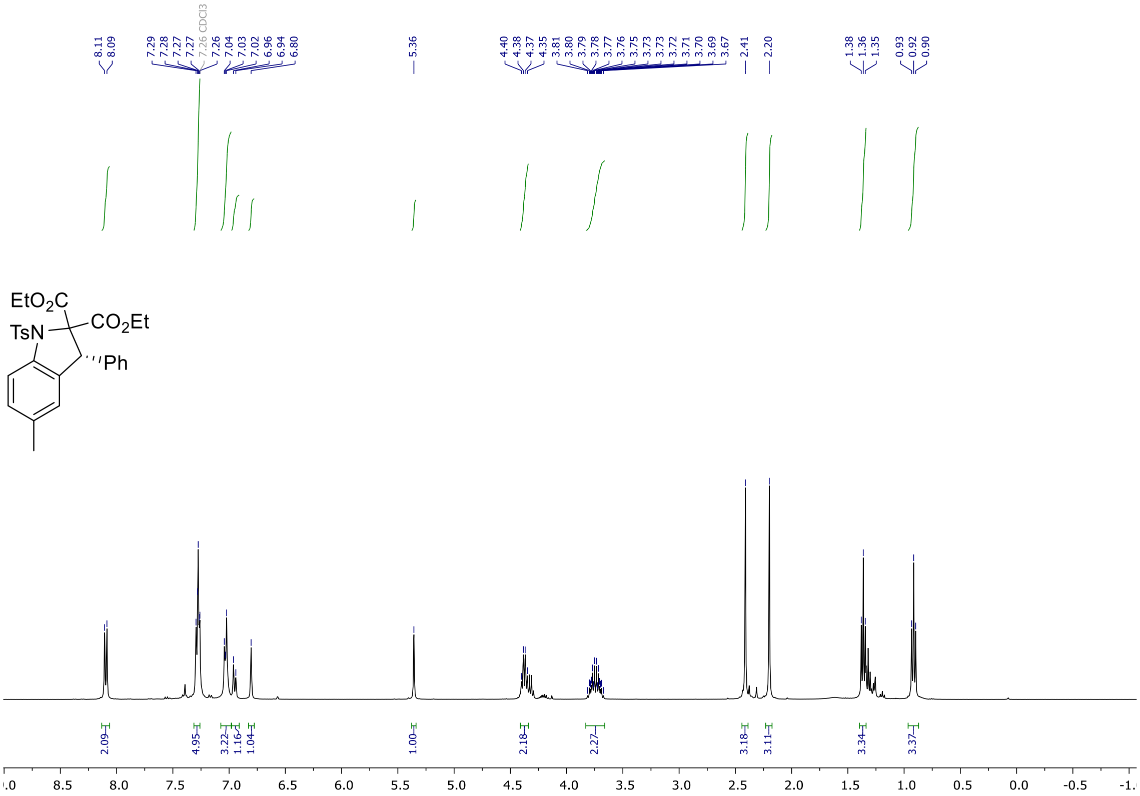


^{13}C NMR (101 MHz, $CDCl_3$)

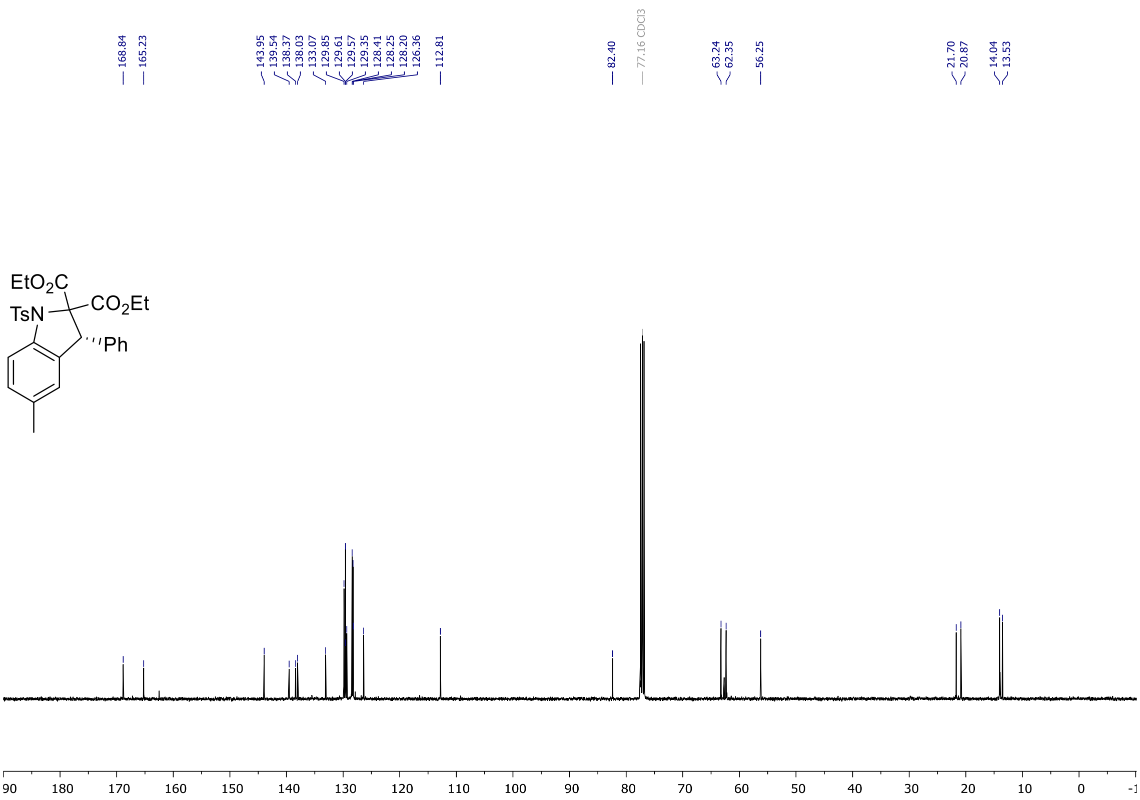


Diethyl (*R*)-5-methyl-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3d)

^{1}H NMR (400 MHz, $CDCl_3$)

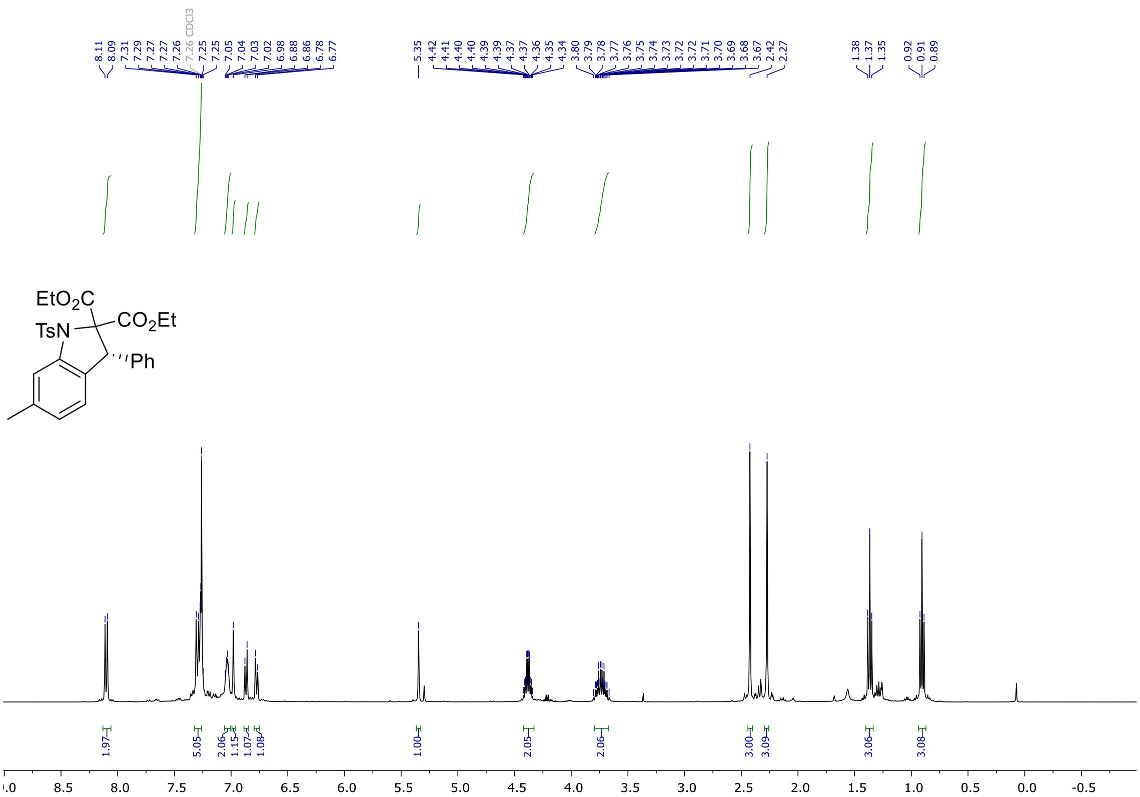


^{13}C NMR (101 MHz, $CDCl_3$)

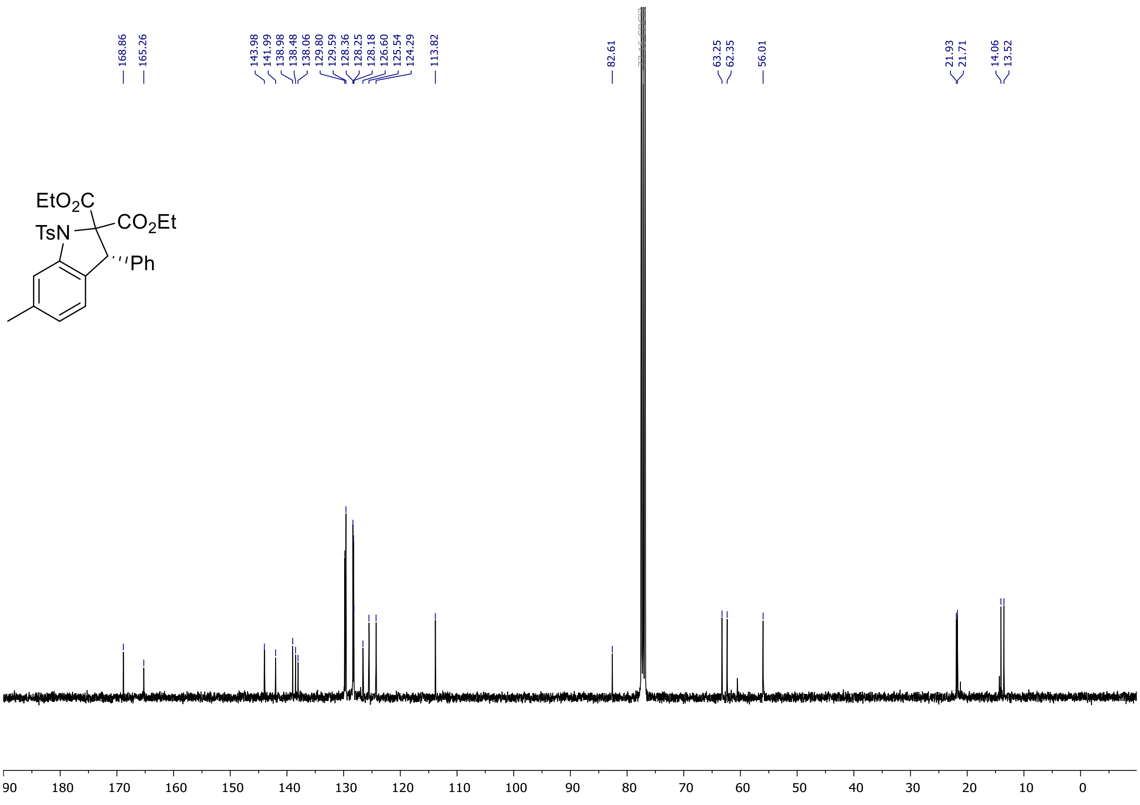


Diethyl (*R*)-6-methyl-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3e)

^{1}H NMR (400 MHz, CDCl$_3$)

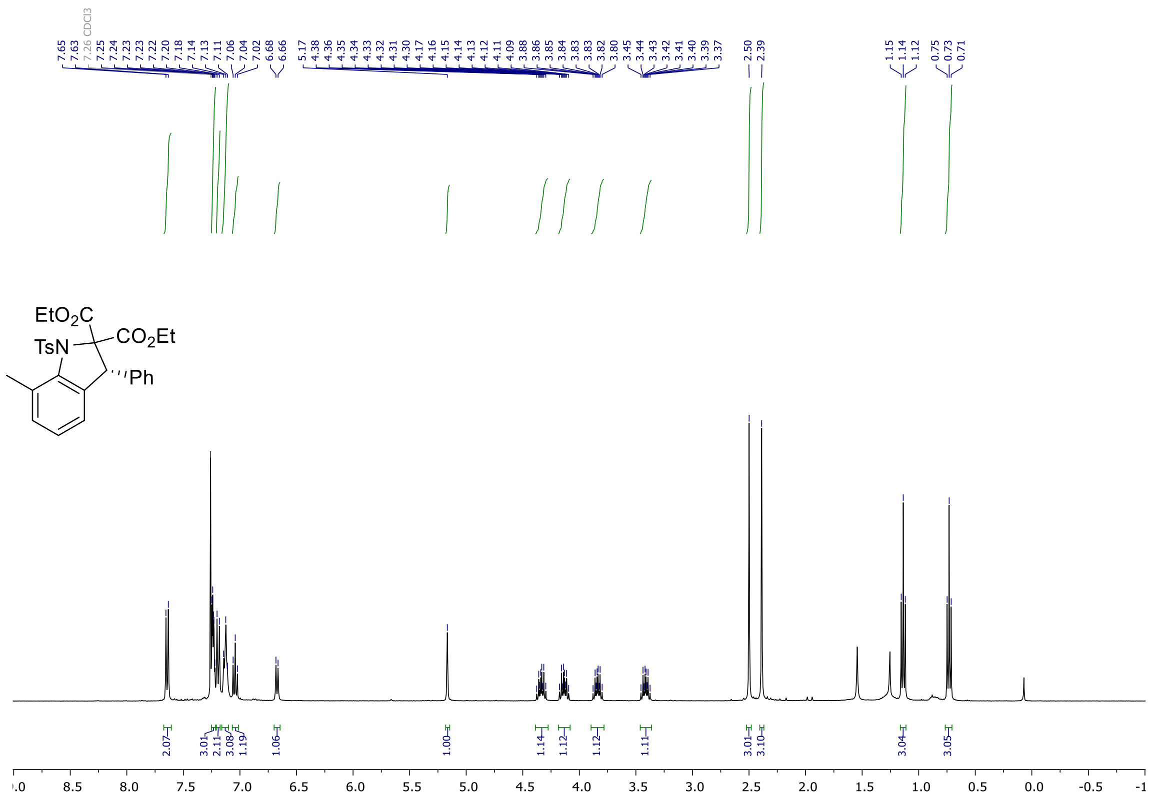


^{13}C NMR (101 MHz, CDCl$_3$)

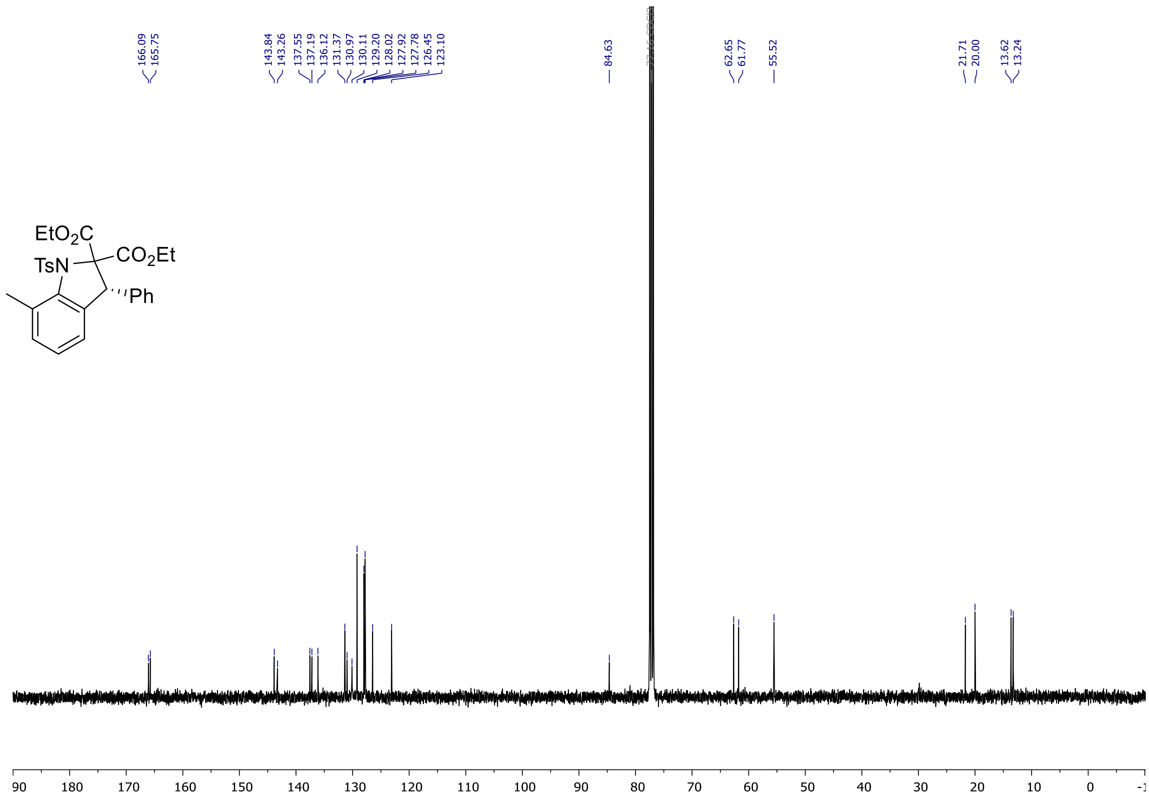


Diethyl (*R*)-7-methyl-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3f)

^{1}H NMR (400 MHz, $CDCl_3$)

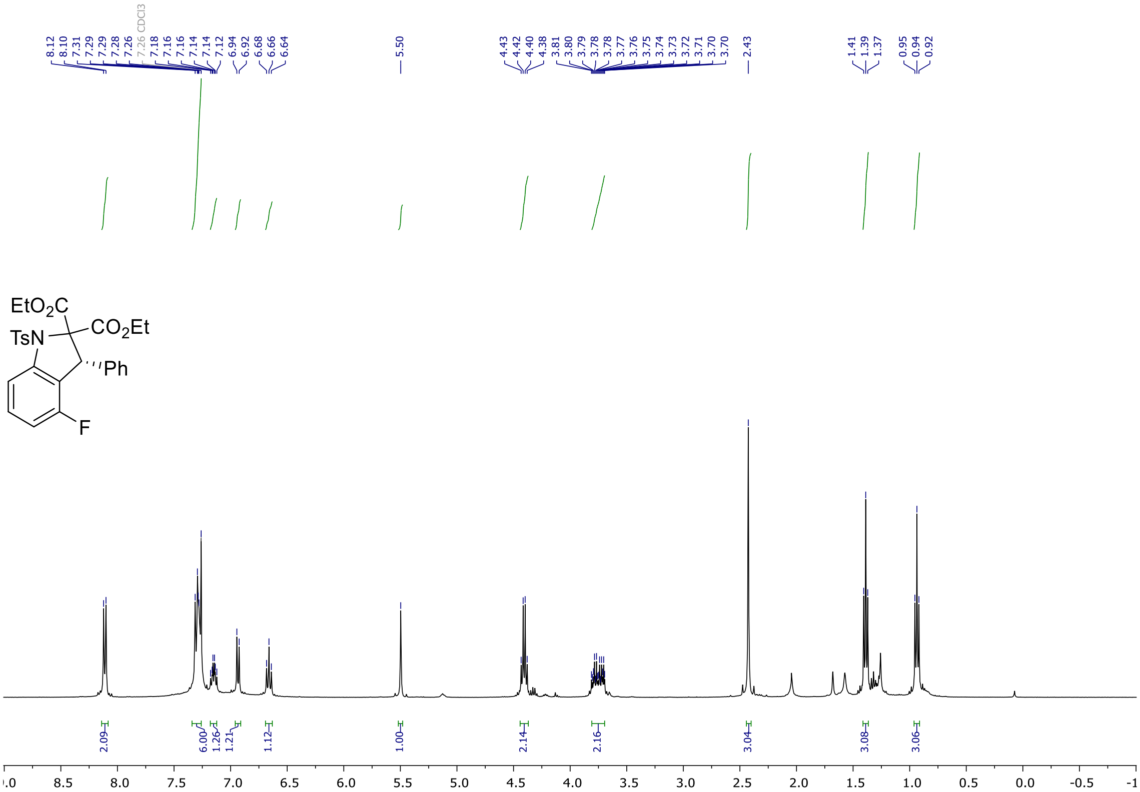


^{13}C NMR (101 MHz, $CDCl_3$)

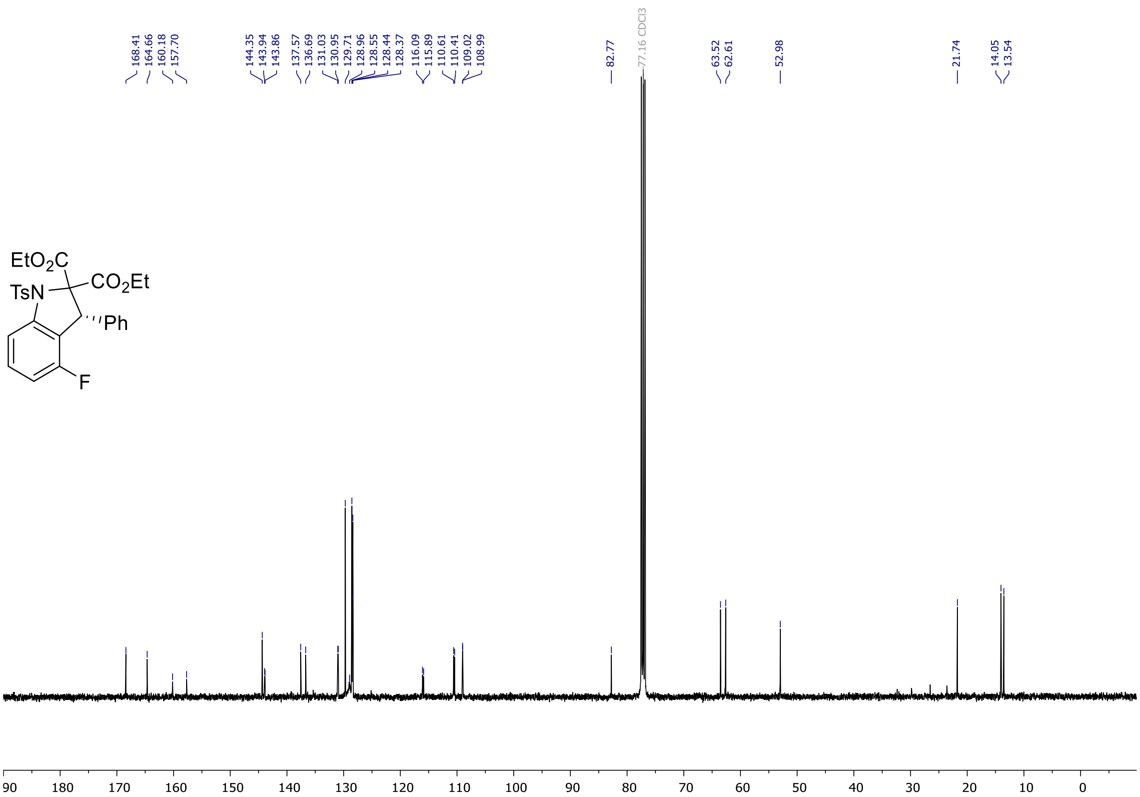


Diethyl (*R*)-4-fluoro-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3g)

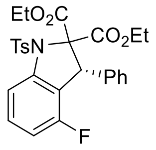
^{1}H NMR (400 MHz, CDCl$_3$)

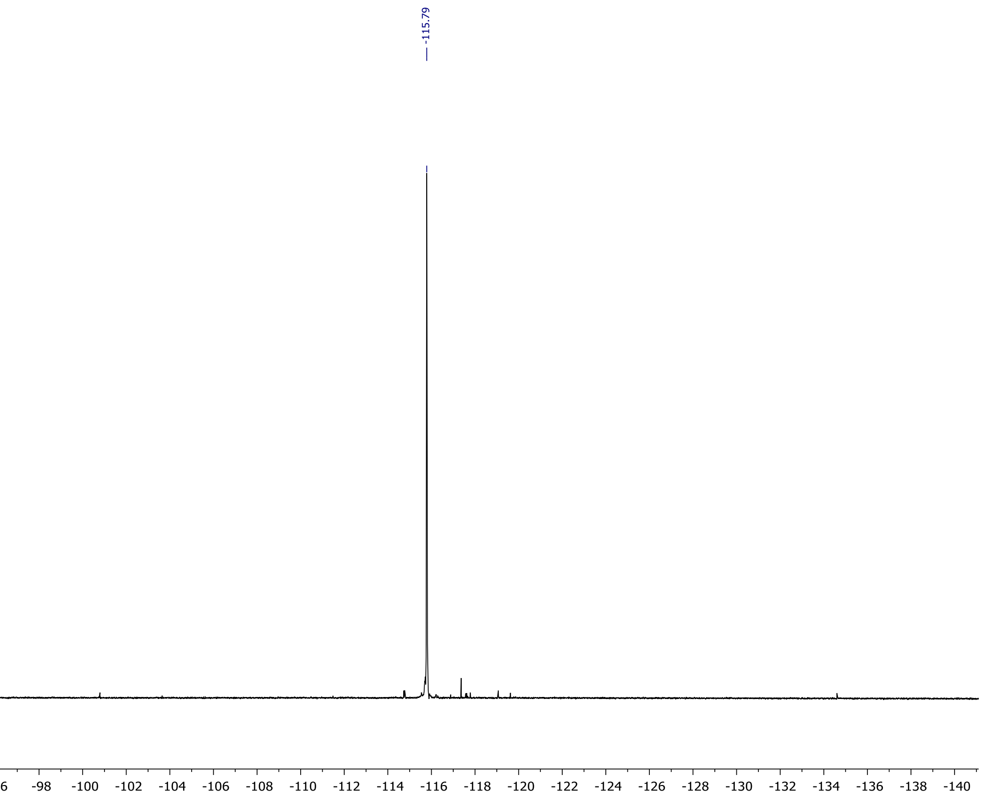


^{13}C NMR (101 MHz, CDCl$_3$)



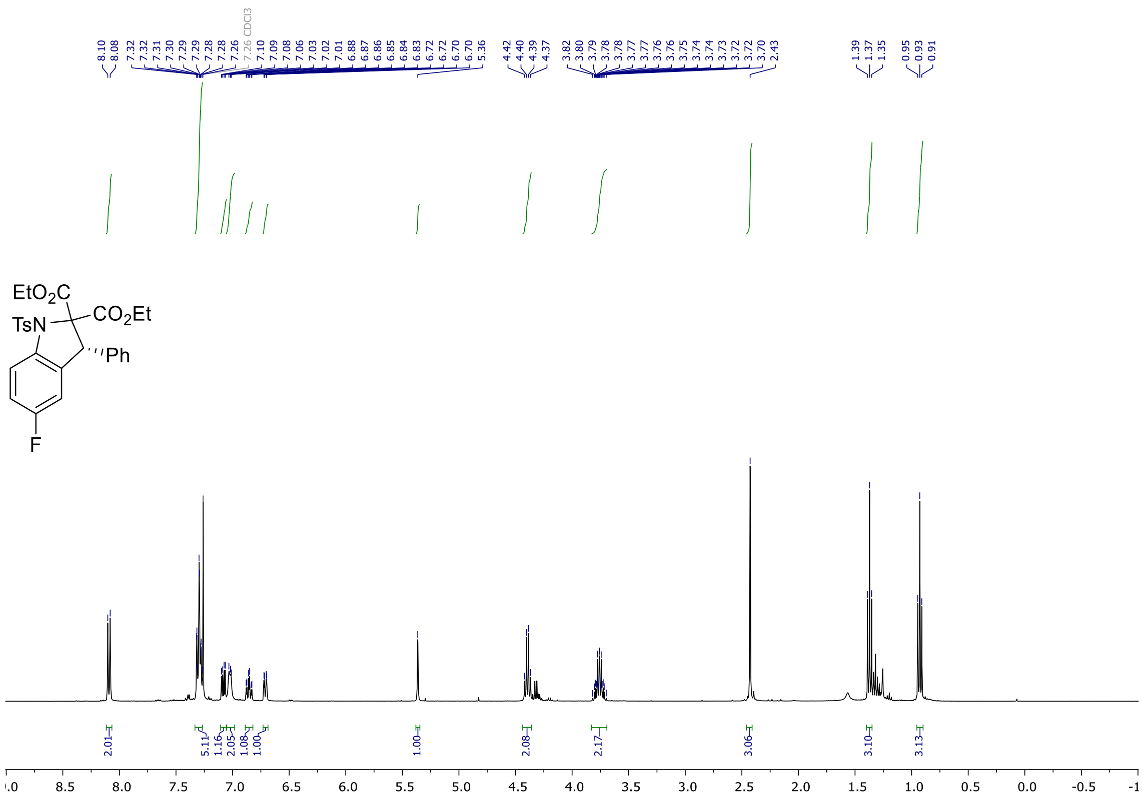
^{19}F NMR (376 MHz, $CDCl_3$)



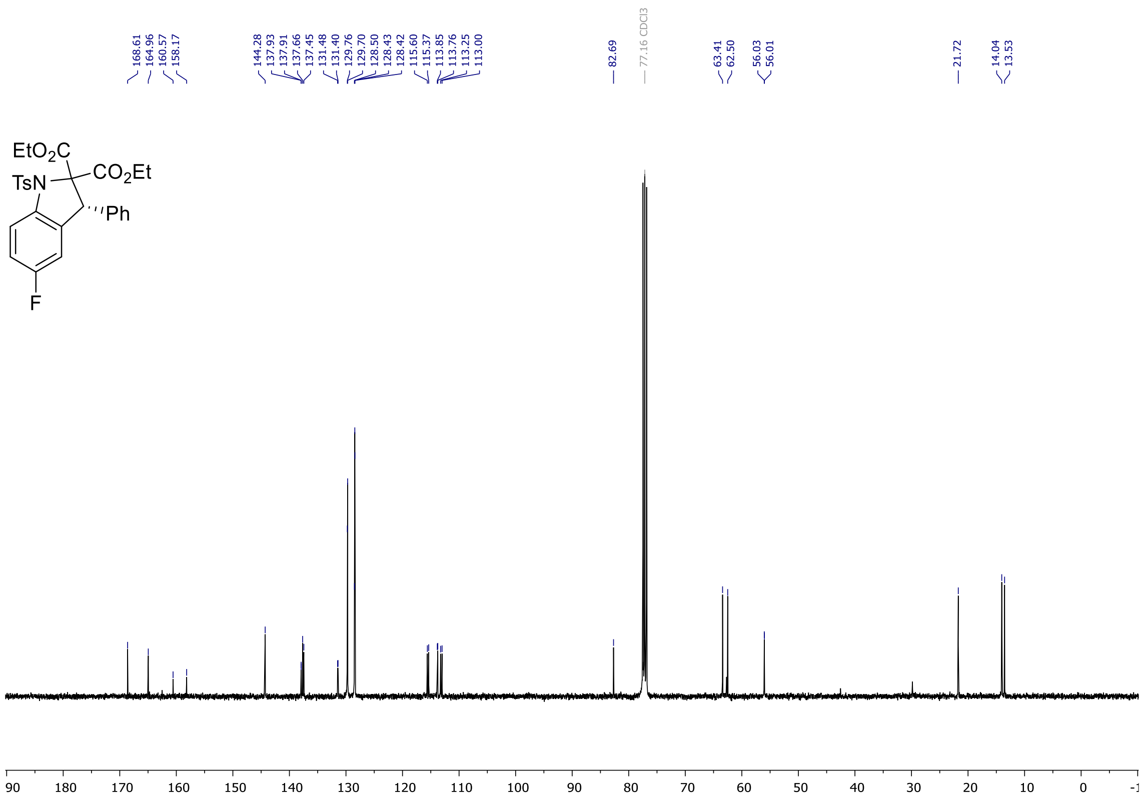


Diethyl (*R*)-5-fluoro-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3h)

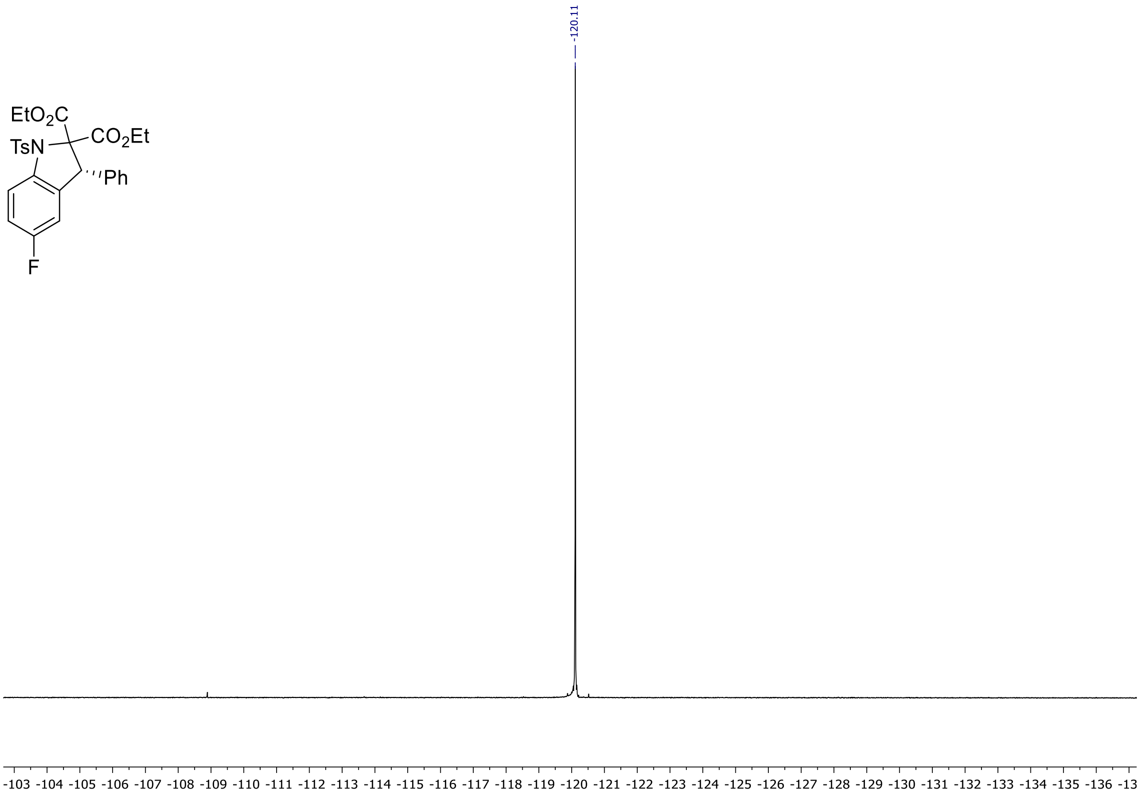
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

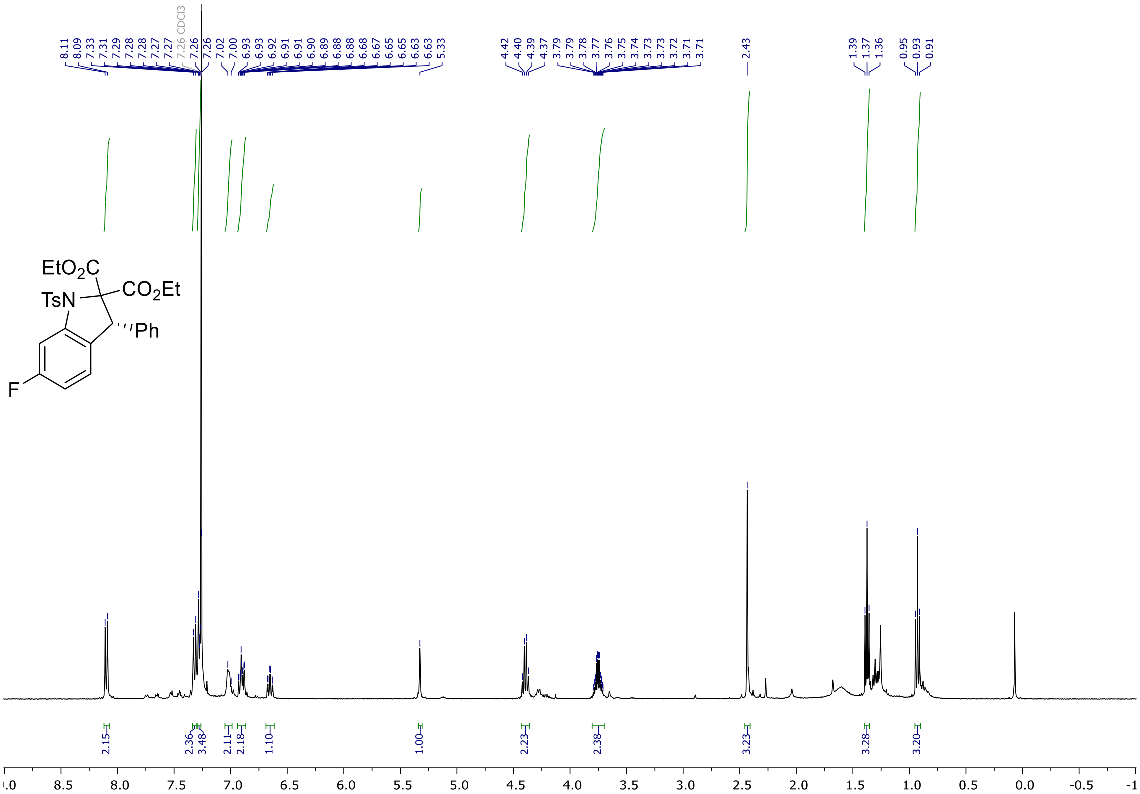


^{19}F NMR (376 MHz, $CDCl_3$)

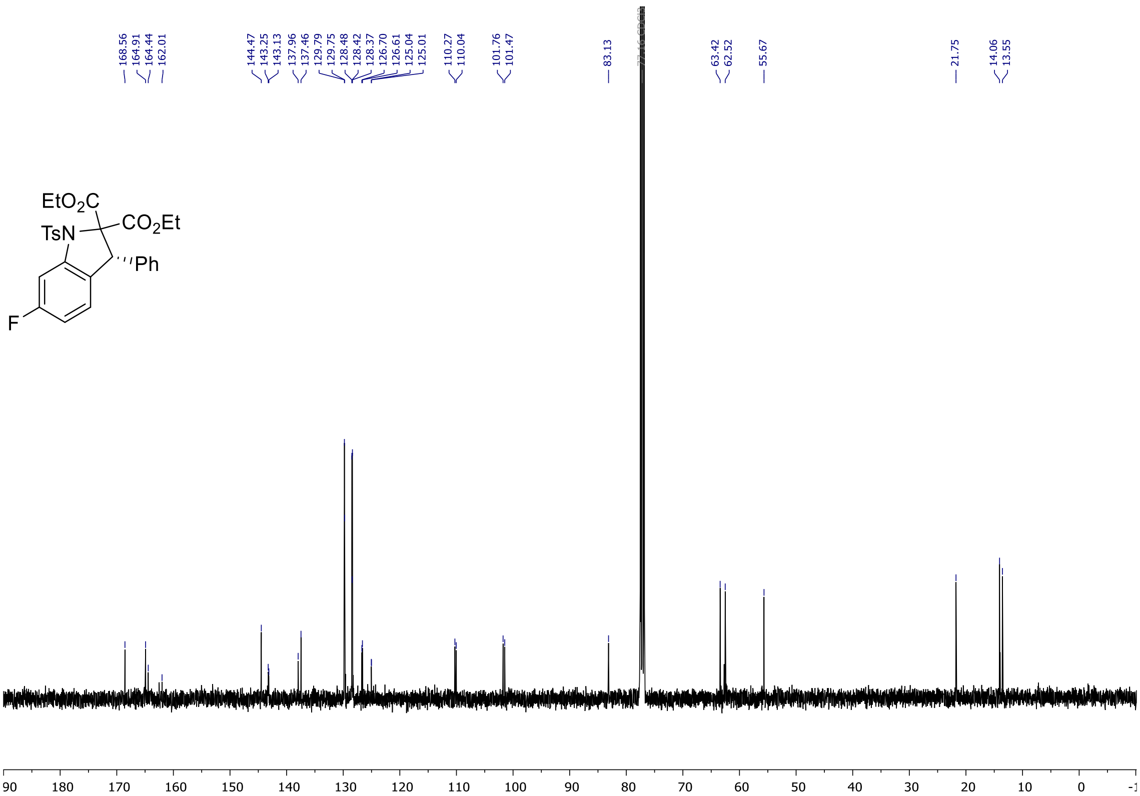


Diethyl (*R*)-6-fluoro-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3i)

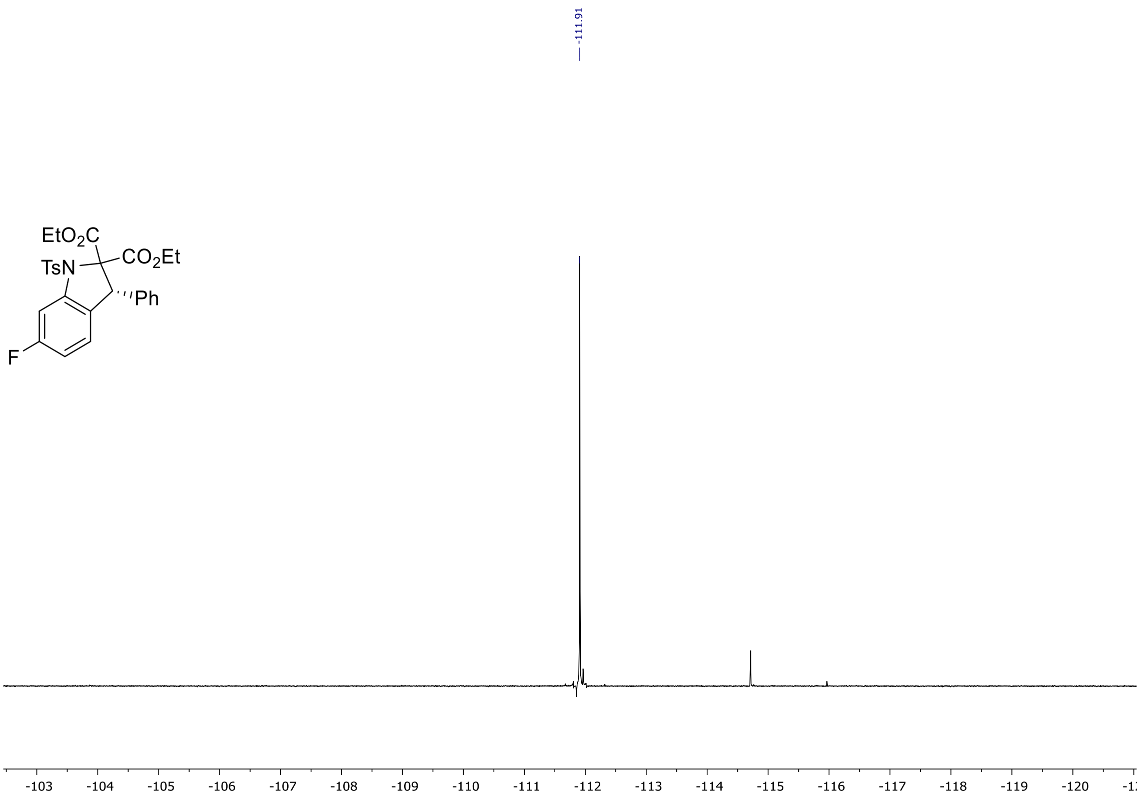
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

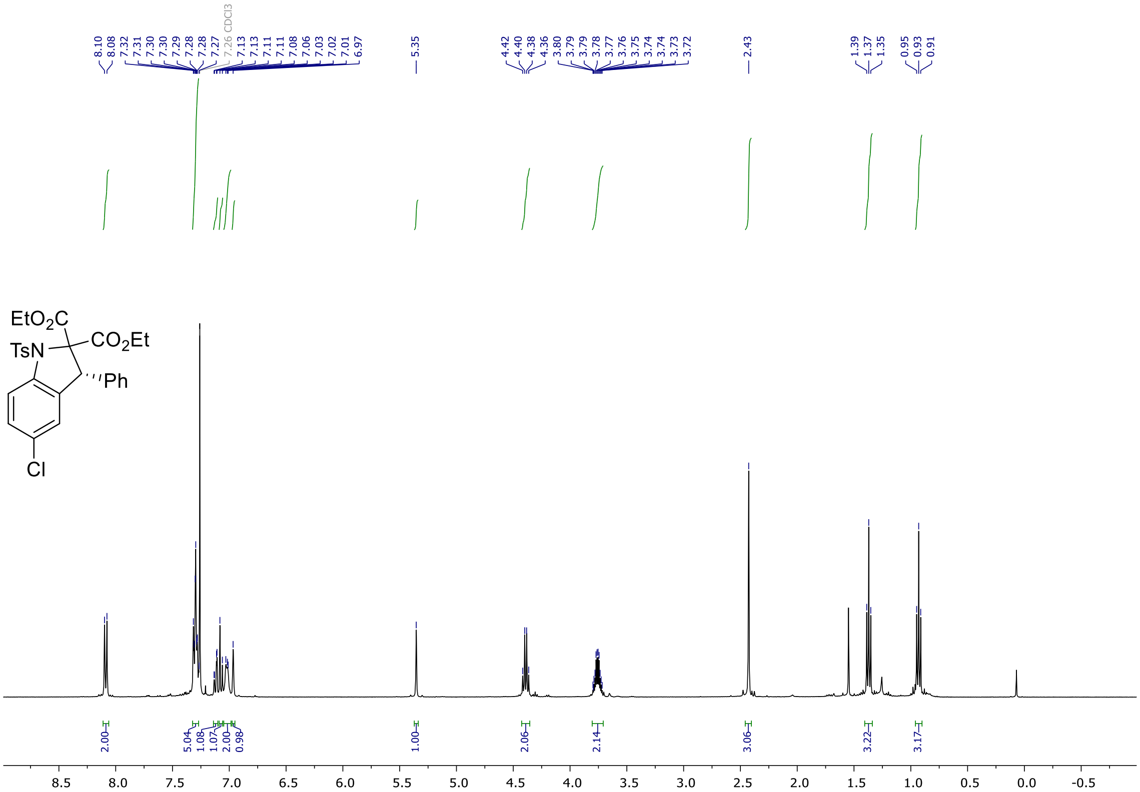


^{19}F NMR (376 MHz, $CDCl_3$)

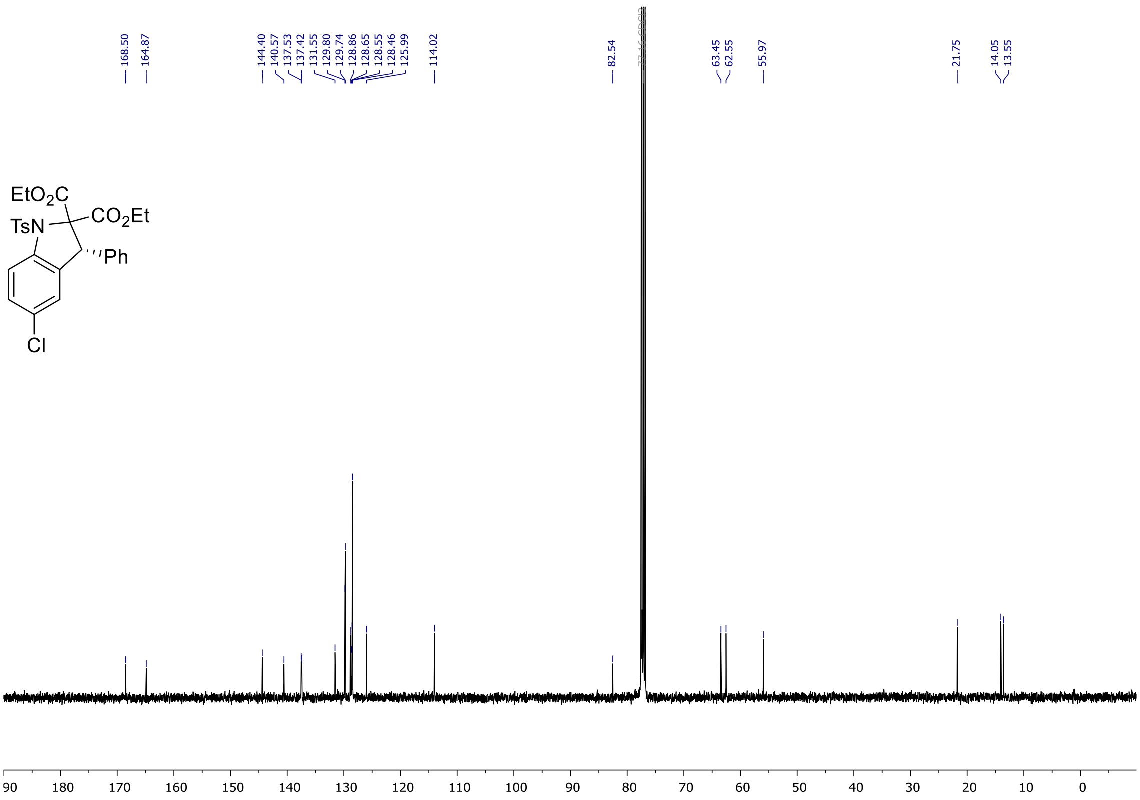


Diethyl (*R*)-5-chloro-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3j)

^{1}H NMR (400 MHz, $CDCl_3$)

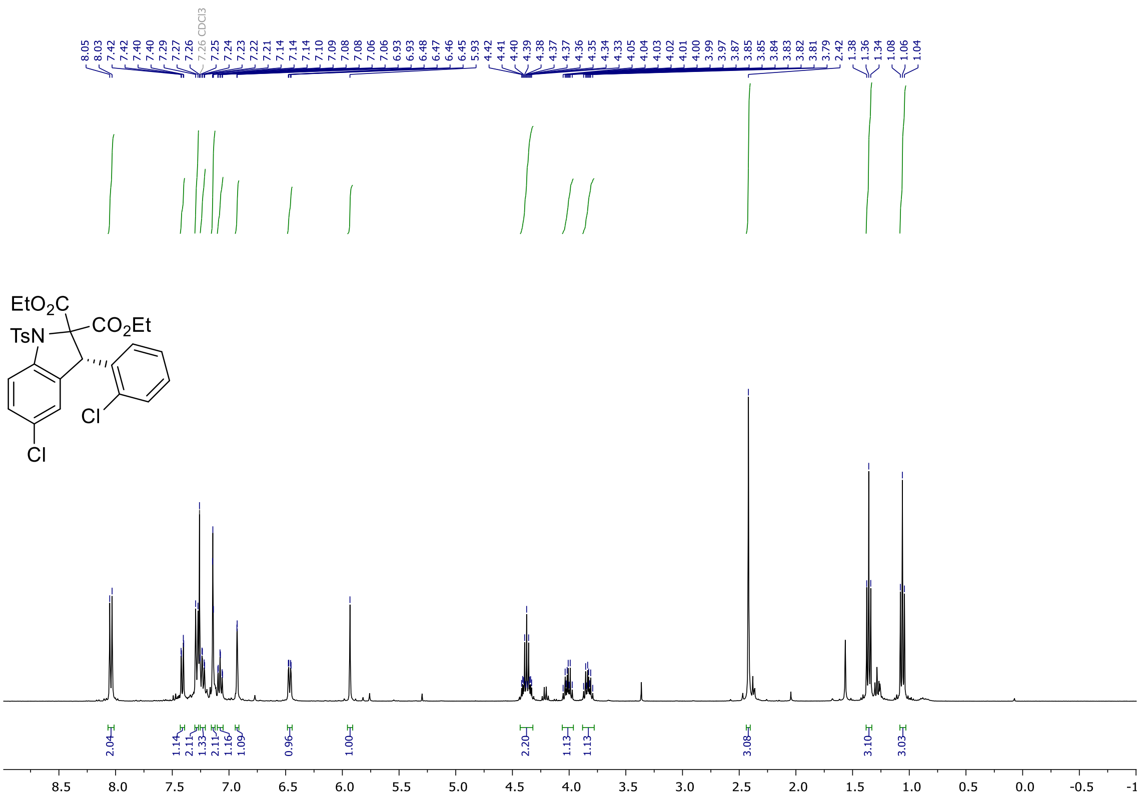


^{13}C NMR (101 MHz, $CDCl_3$)

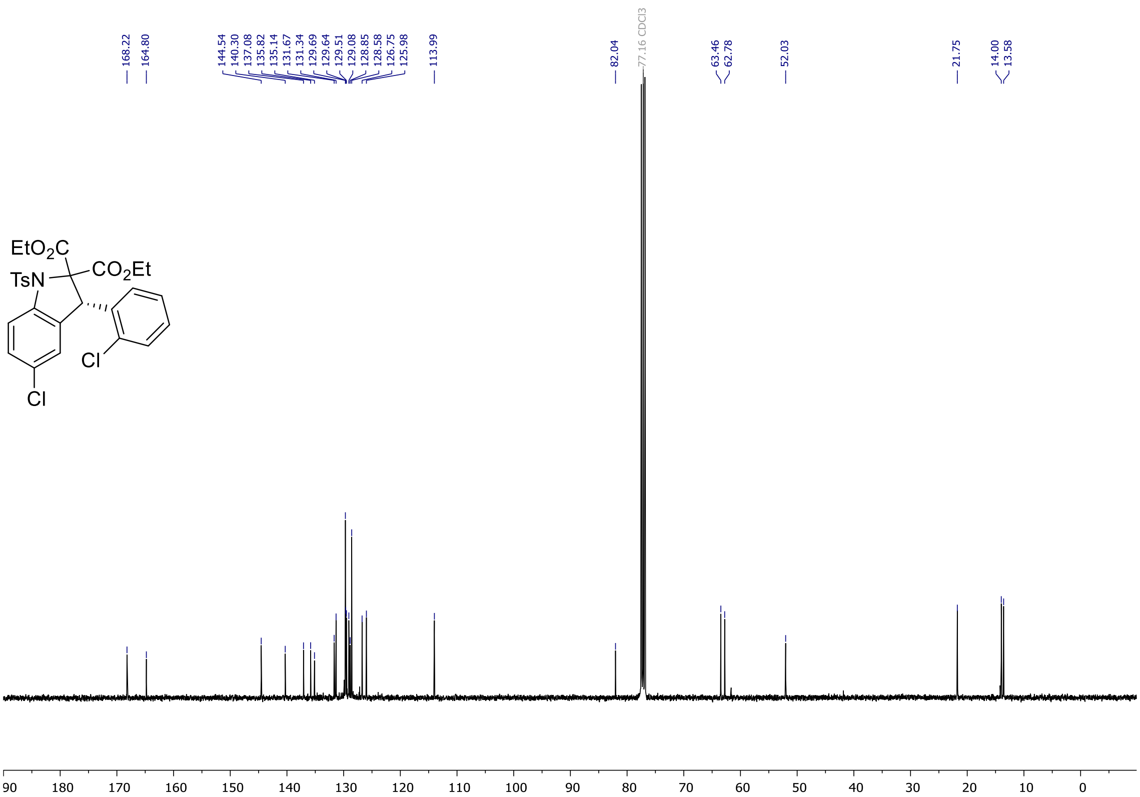


Diethyl (*S*)-5-chloro-3-(2-chlorophenyl)-1-tosylindoline-2,2-dicarboxylate (3k)

^{1}H NMR (400 MHz, $CDCl_3$)

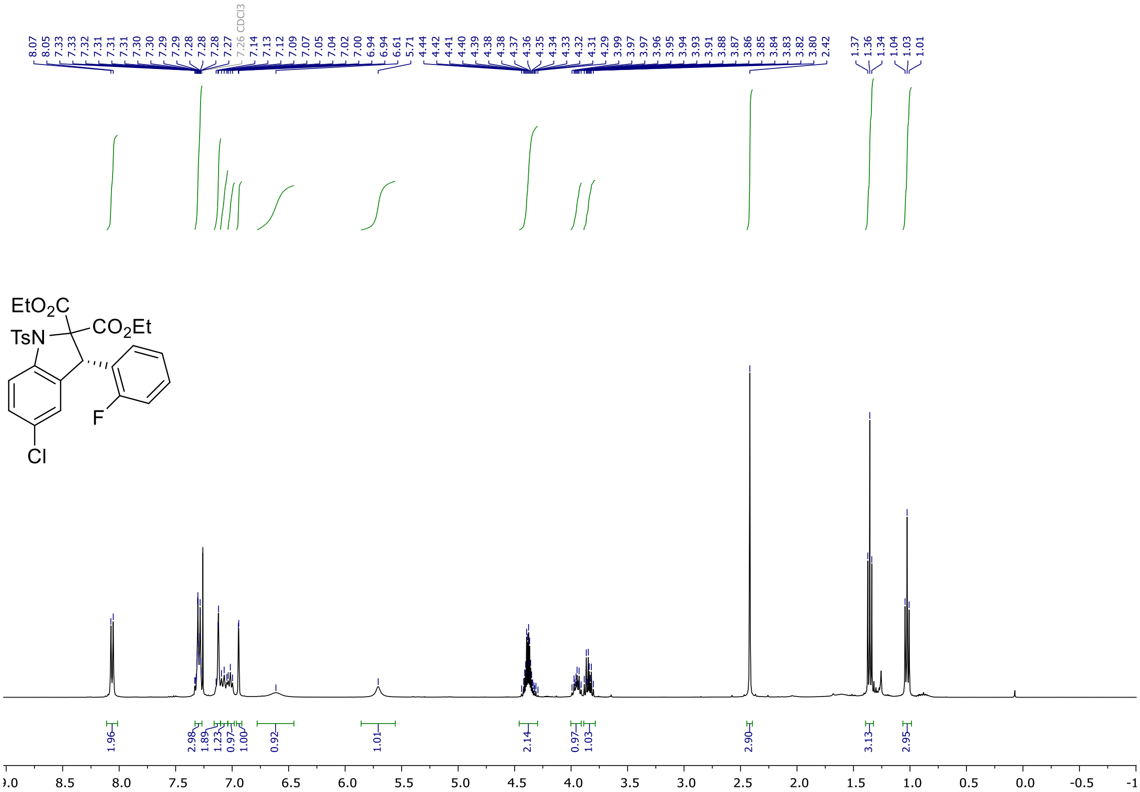


^{13}C NMR (101 MHz, $CDCl_3$)

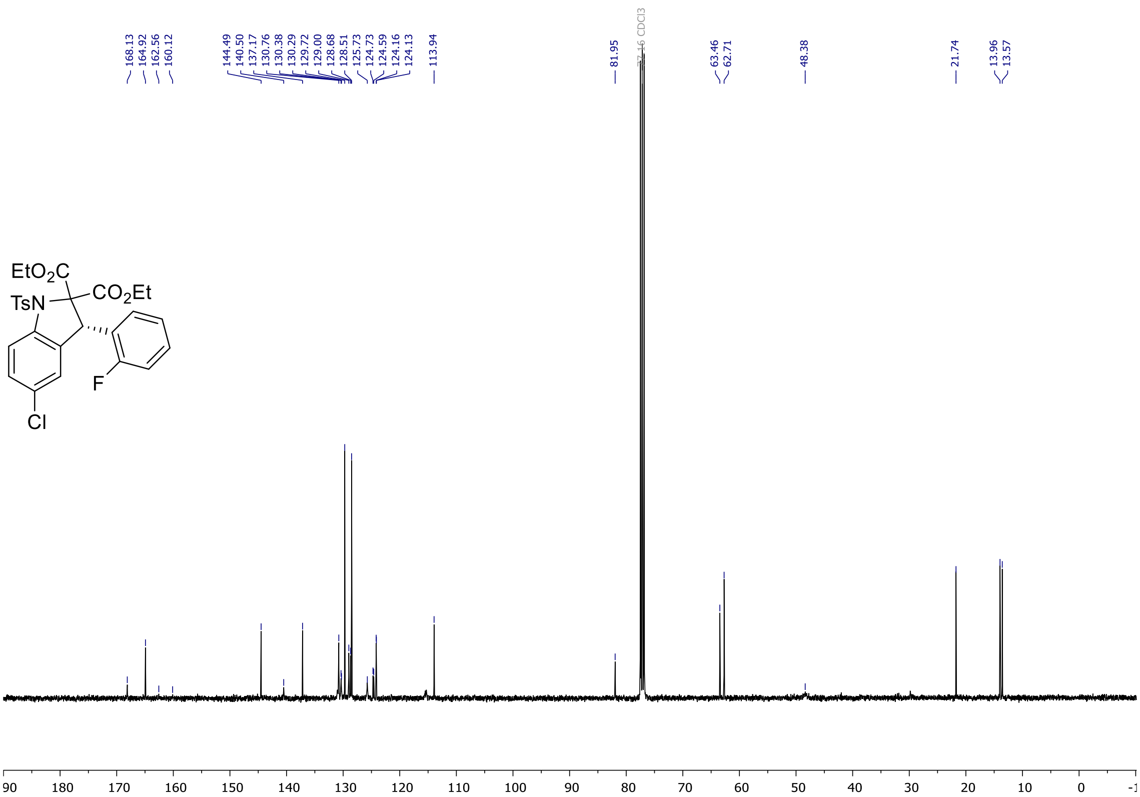


Diethyl (*S*)-5-chloro-3-(2-fluorophenyl)-1-tosylindoline-2,2-dicarboxylate (3l)

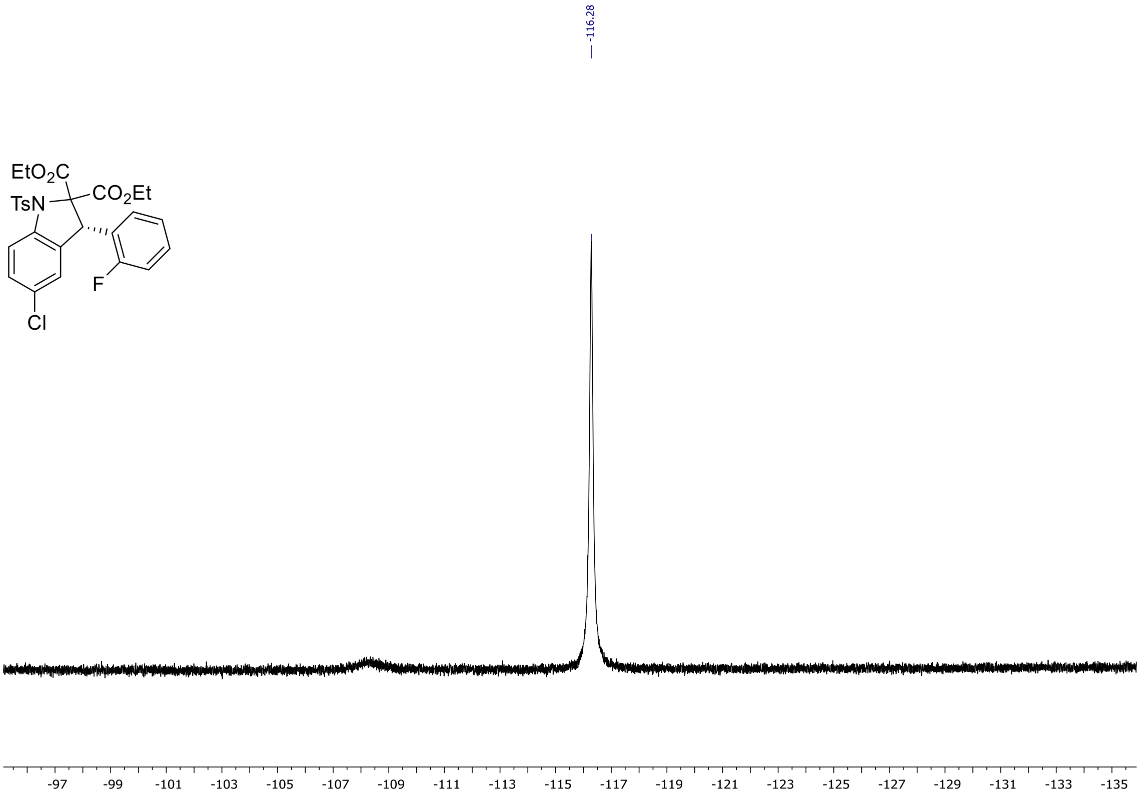
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

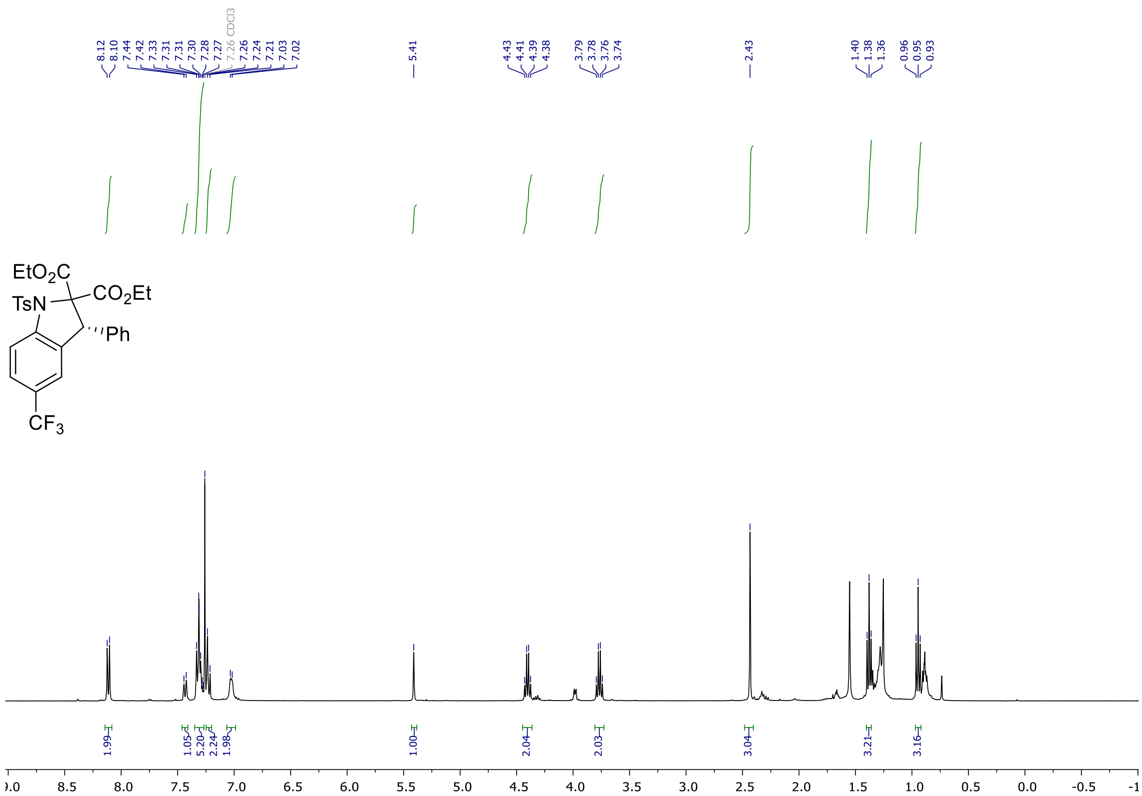


^{19}F NMR (376 MHz, $CDCl_3$)

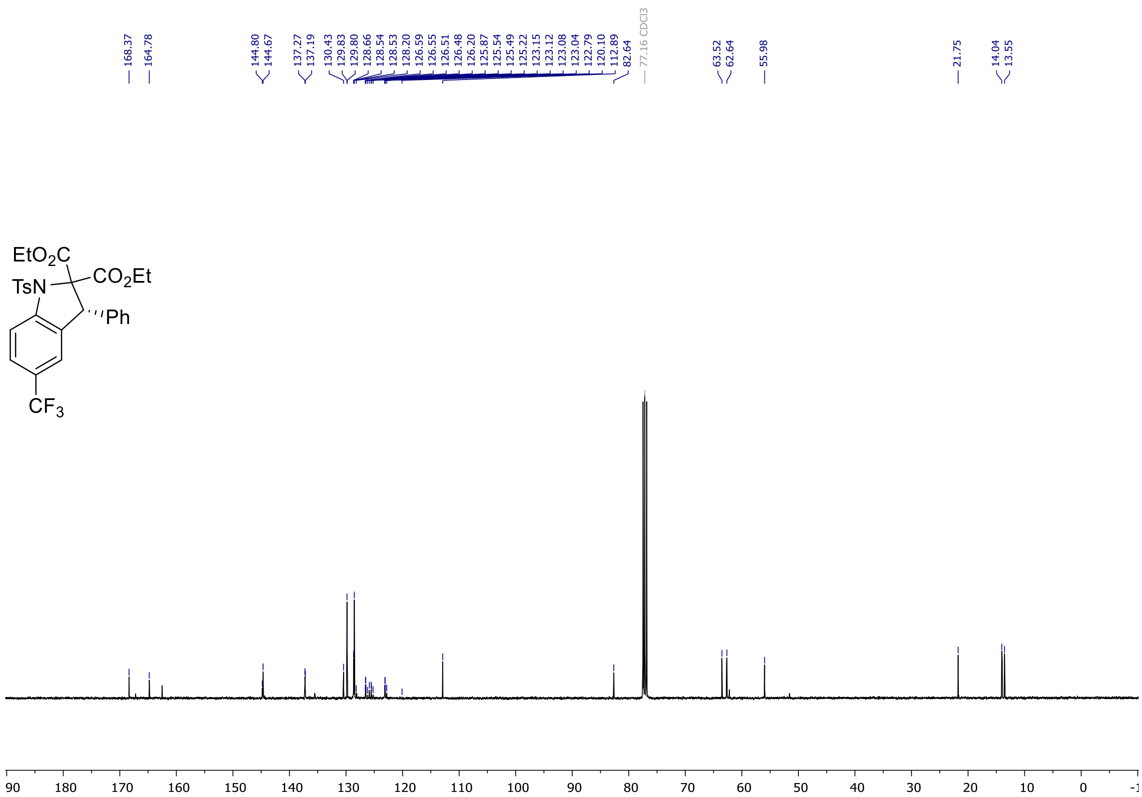


Diethyl (*R*)-3-phenyl-1-tosyl-5-(trifluoromethyl)indoline-2,2-dicarboxylate (3m)

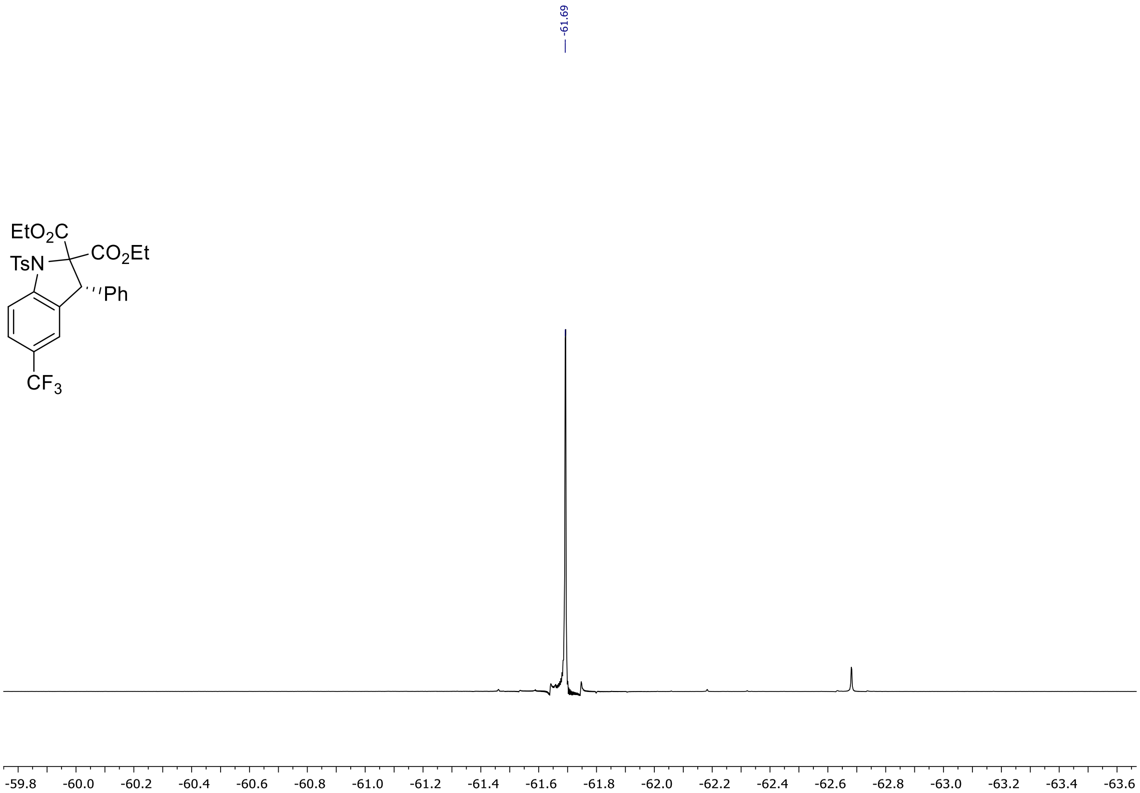
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

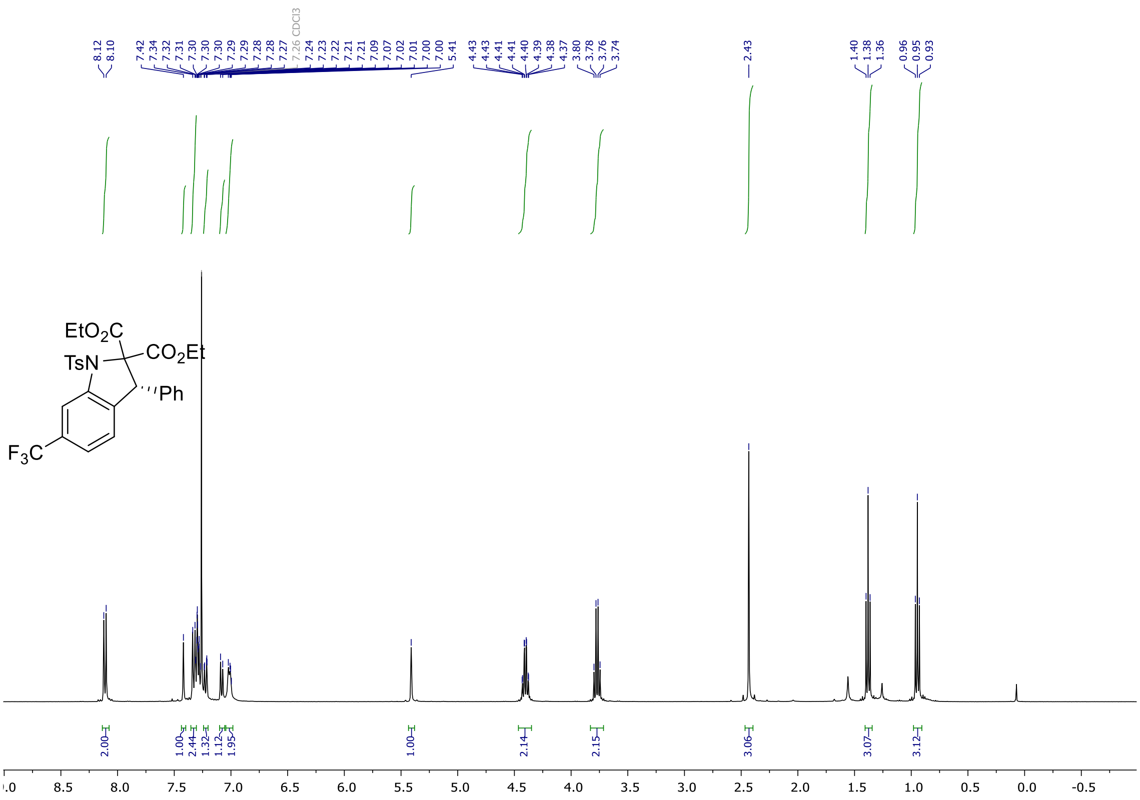


^{19}F NMR (376 MHz, CDCl$_3$)

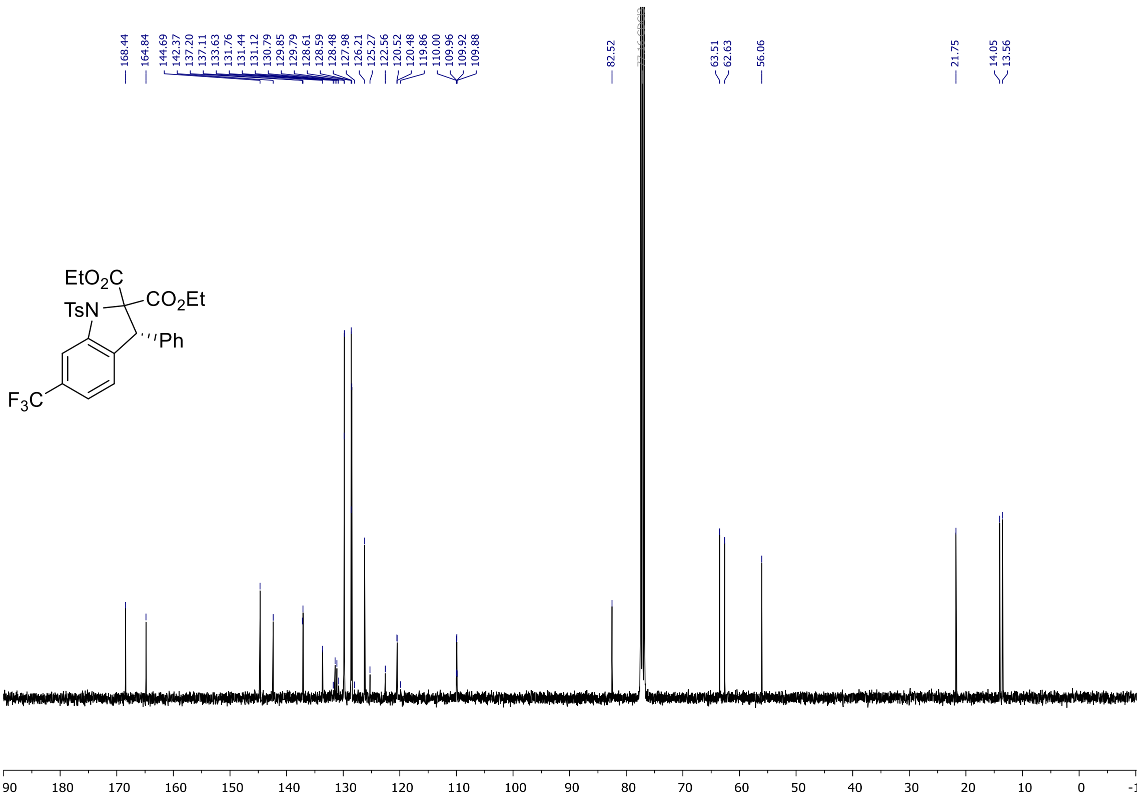


Diethyl (*R*)-3-phenyl-1-tosyl-6-(trifluoromethyl)indoline-2,2-dicarboxylate (3n)

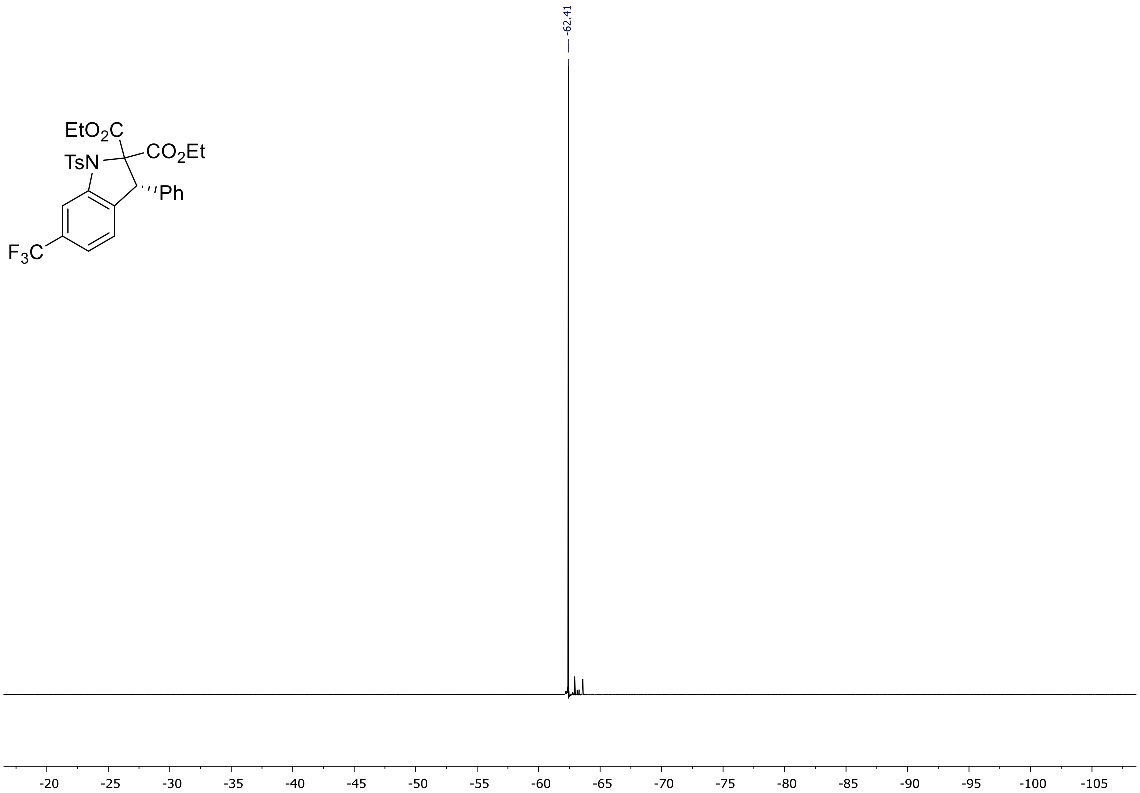
^{1}H NMR (400 MHz, CDCl$_3$)



^{13}C NMR (101 MHz, CDCl$_3$)

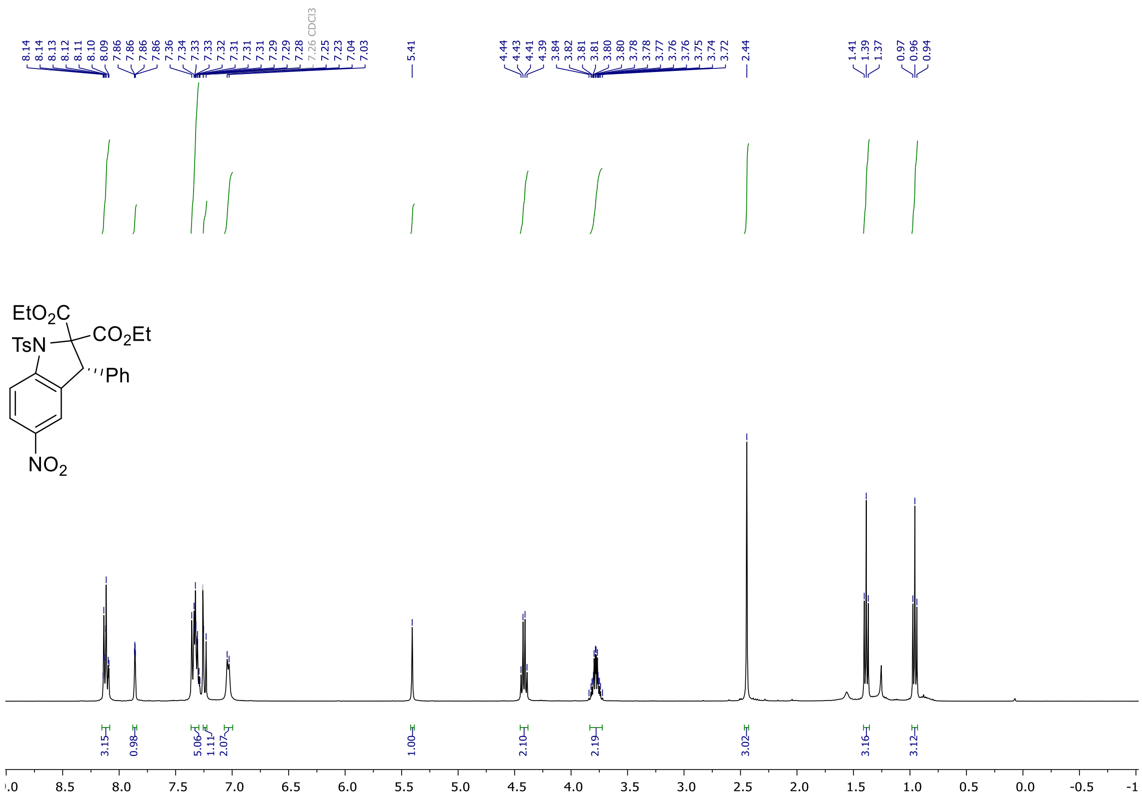


^{19}F NMR (376 MHz, $CDCl_3$)

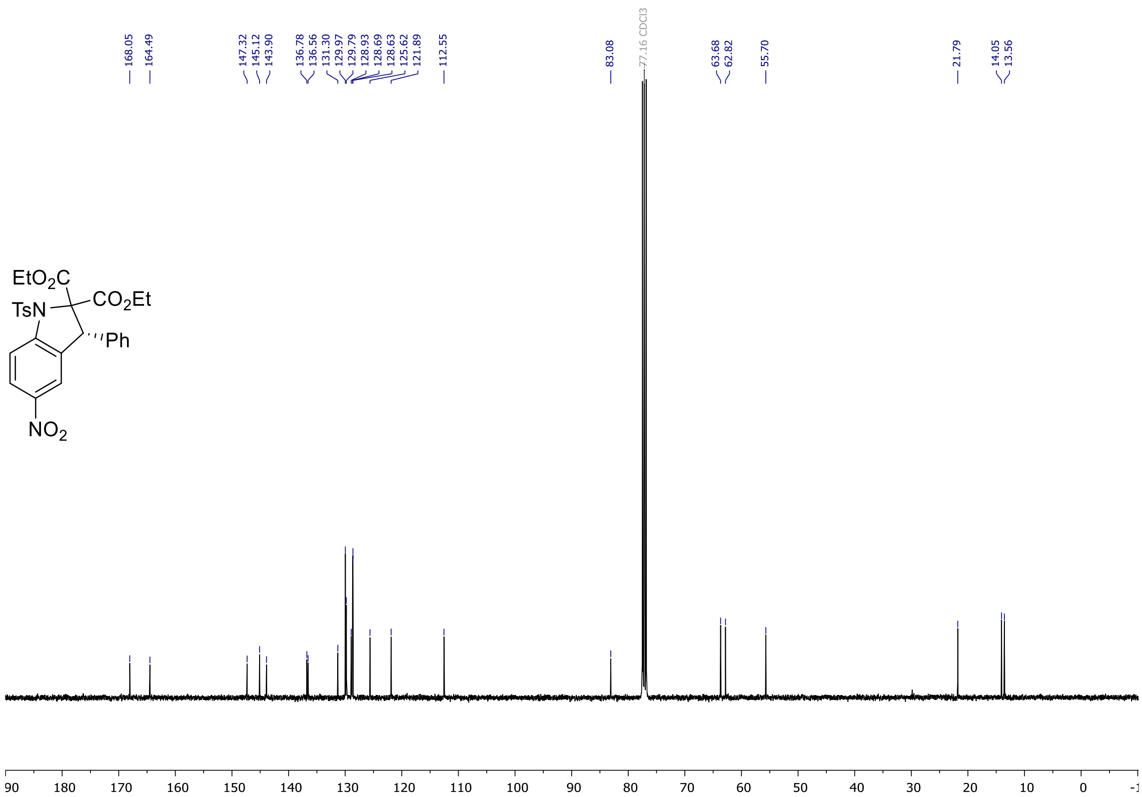


Diethyl (*R*)-5-nitro-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3o)

^{1}H NMR (400 MHz, $CDCl_3$)

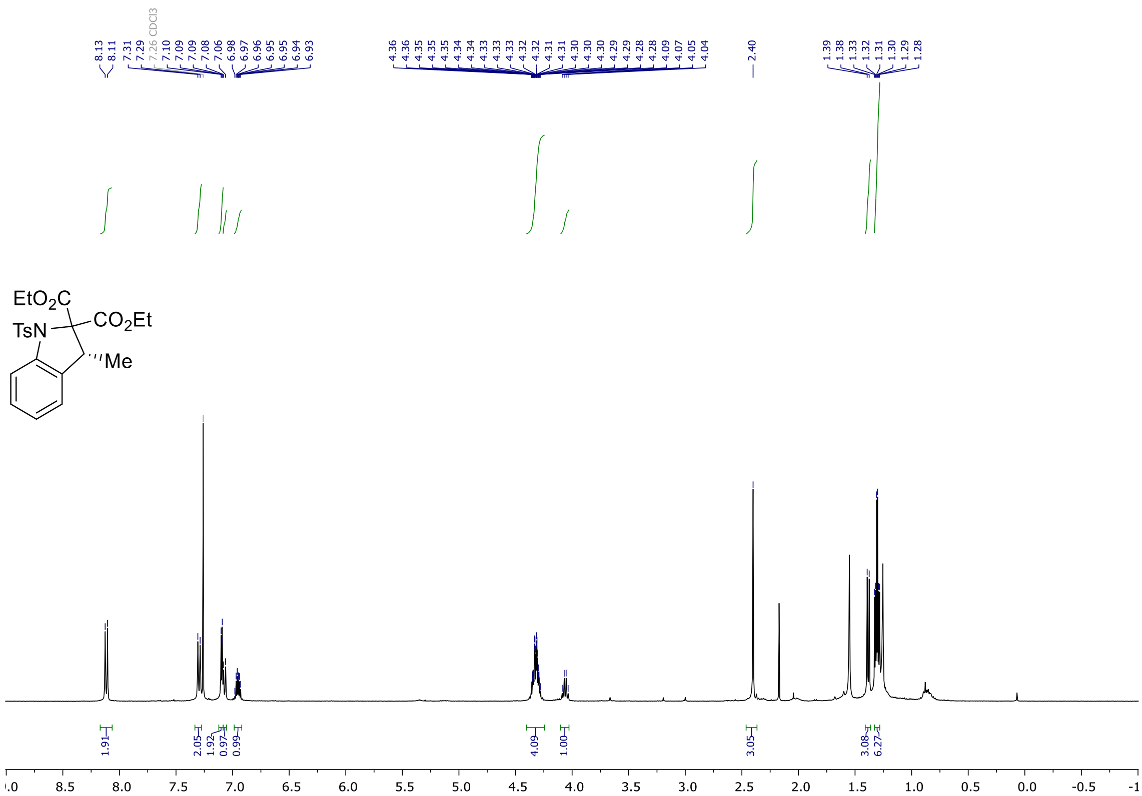


^{13}C NMR (101 MHz, $CDCl_3$)

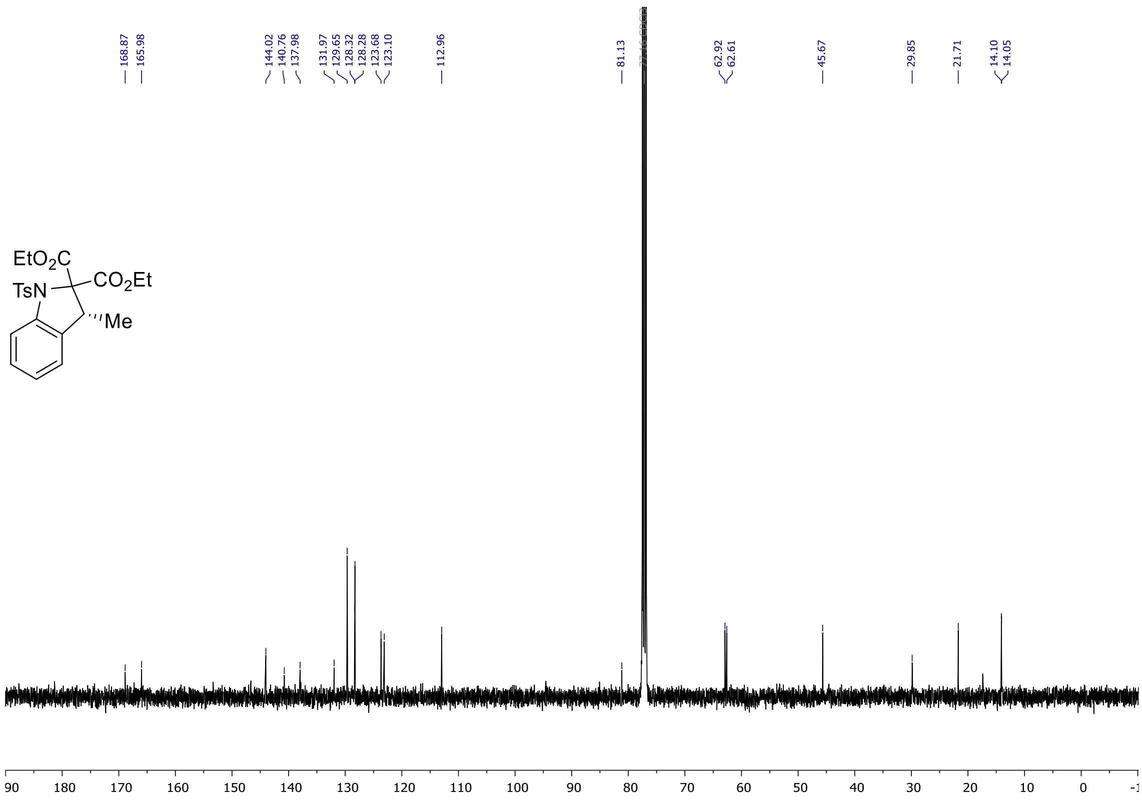


Diethyl (*R*)-3-methyl-1-tosylindoline-2,2-dicarboxylate (3p)

^{1}H NMR (400 MHz, $CDCl_3$)

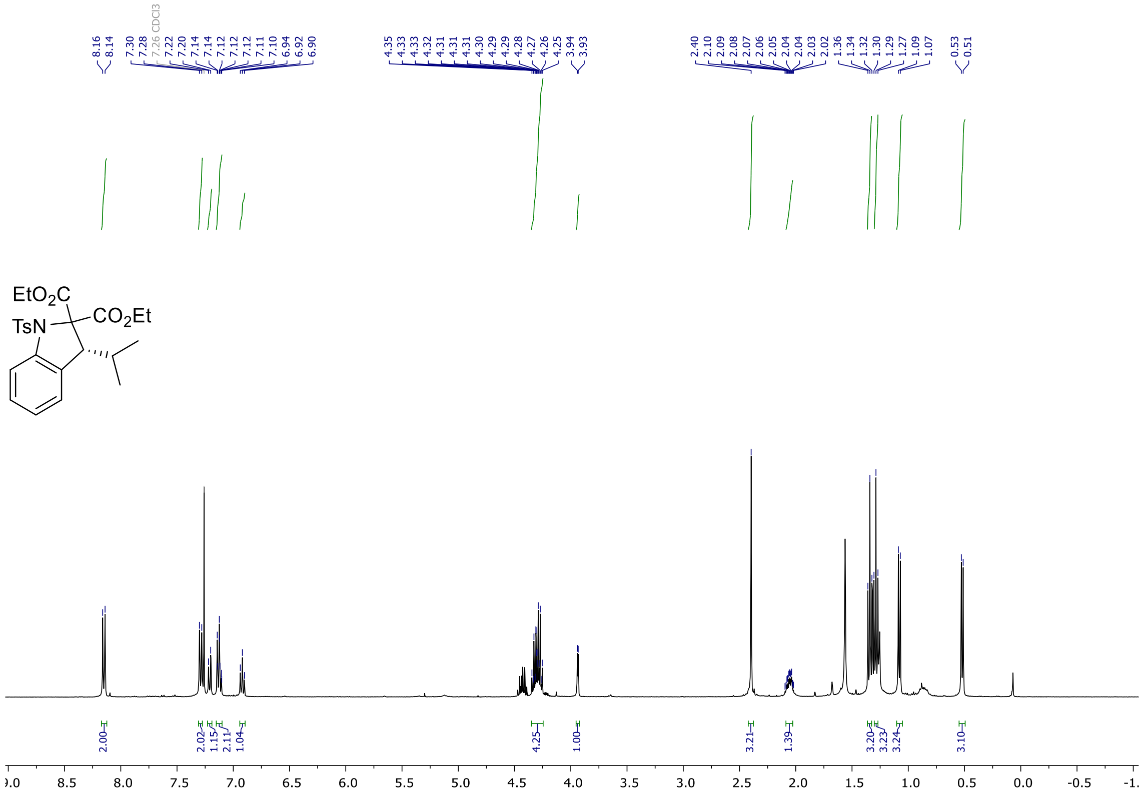


^{13}C NMR (101 MHz, $CDCl_3$)

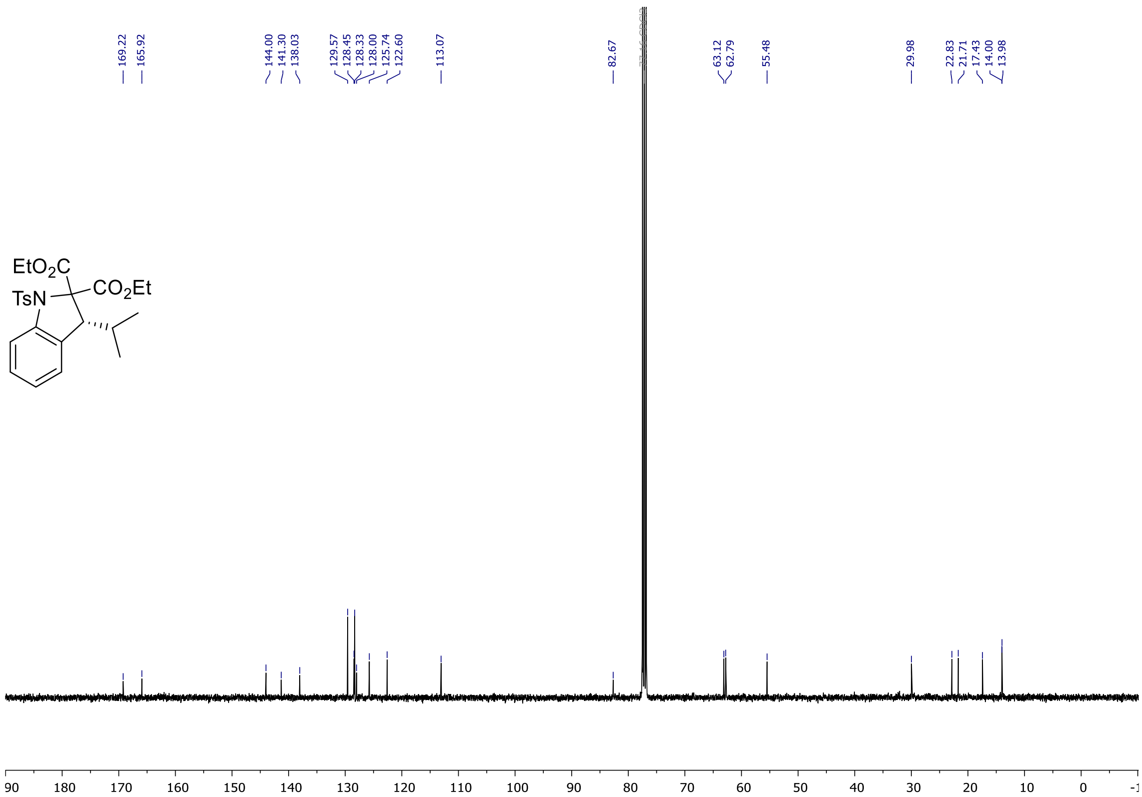


Diethyl (*R*)-3-isopropyl-1-tosylindoline-2,2-dicarboxylate (3q)

^{1}H NMR (400 MHz, $CDCl_3$)

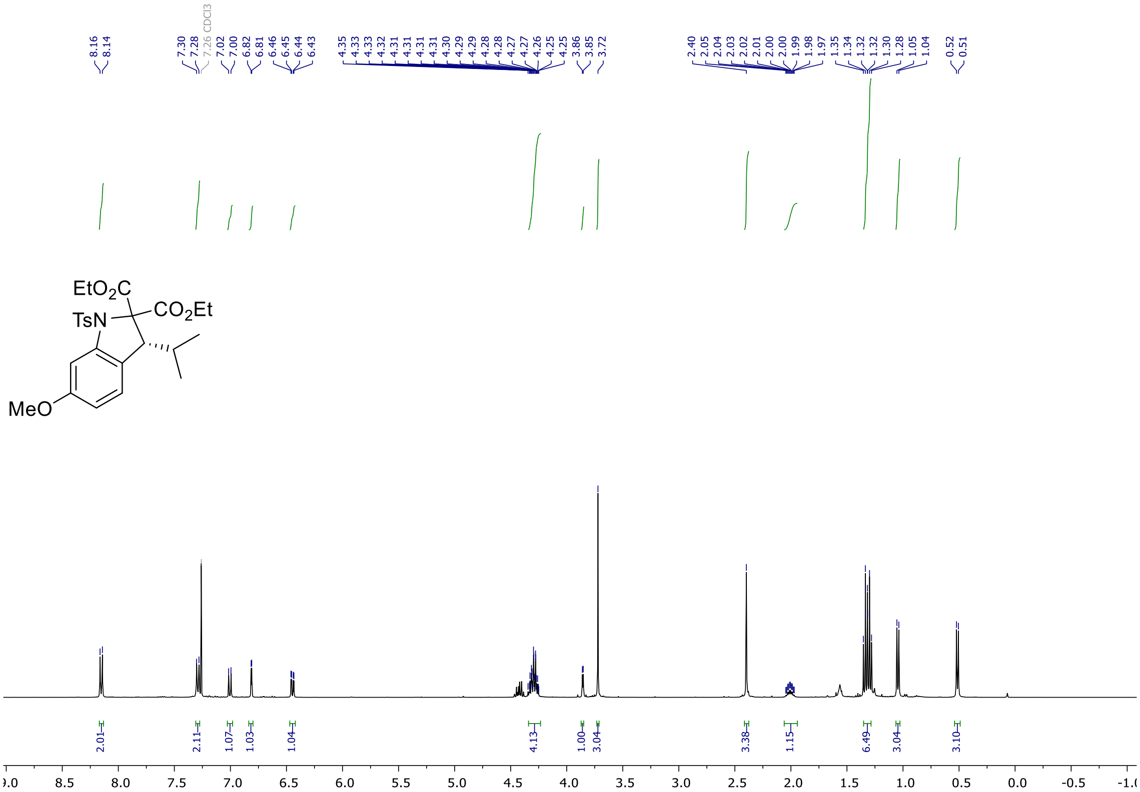


^{13}C NMR (101 MHz, $CDCl_3$)

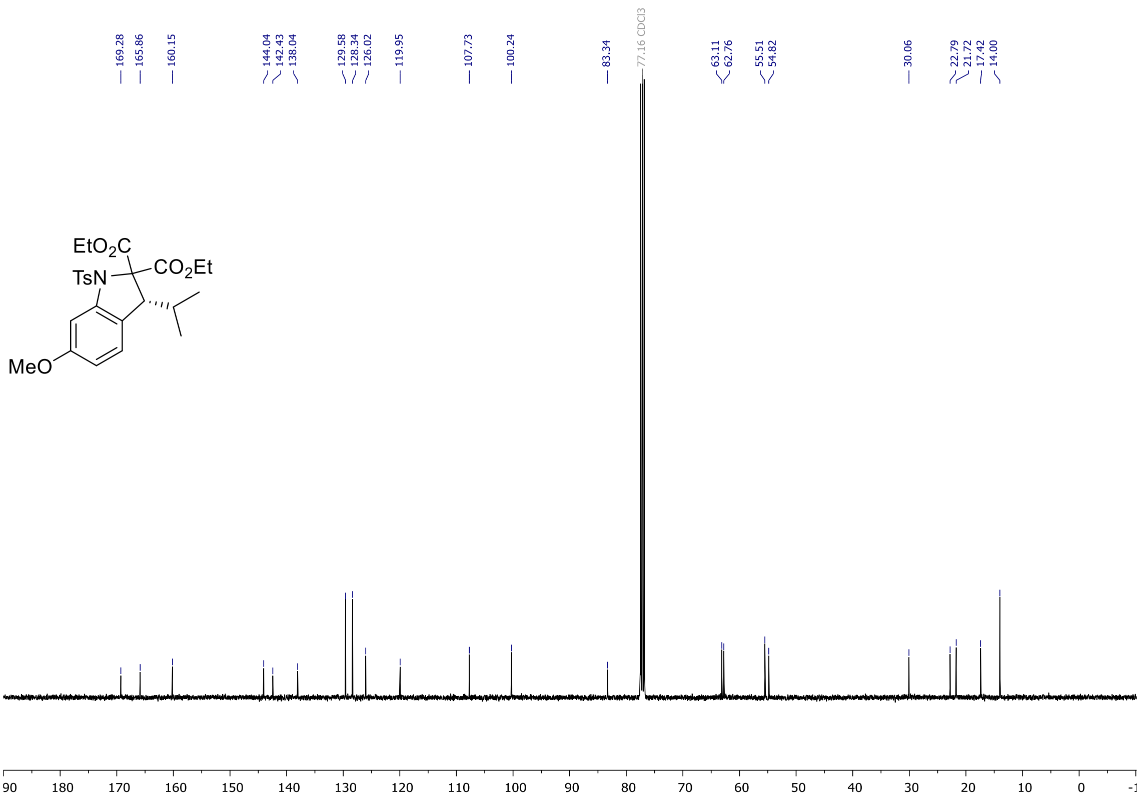


Diethyl (*R*)-3-isopropyl-6-methoxy-1-tosylindoline-2,2-dicarboxylate (3r)

^{1}H NMR (400 MHz, CDCl$_3$)

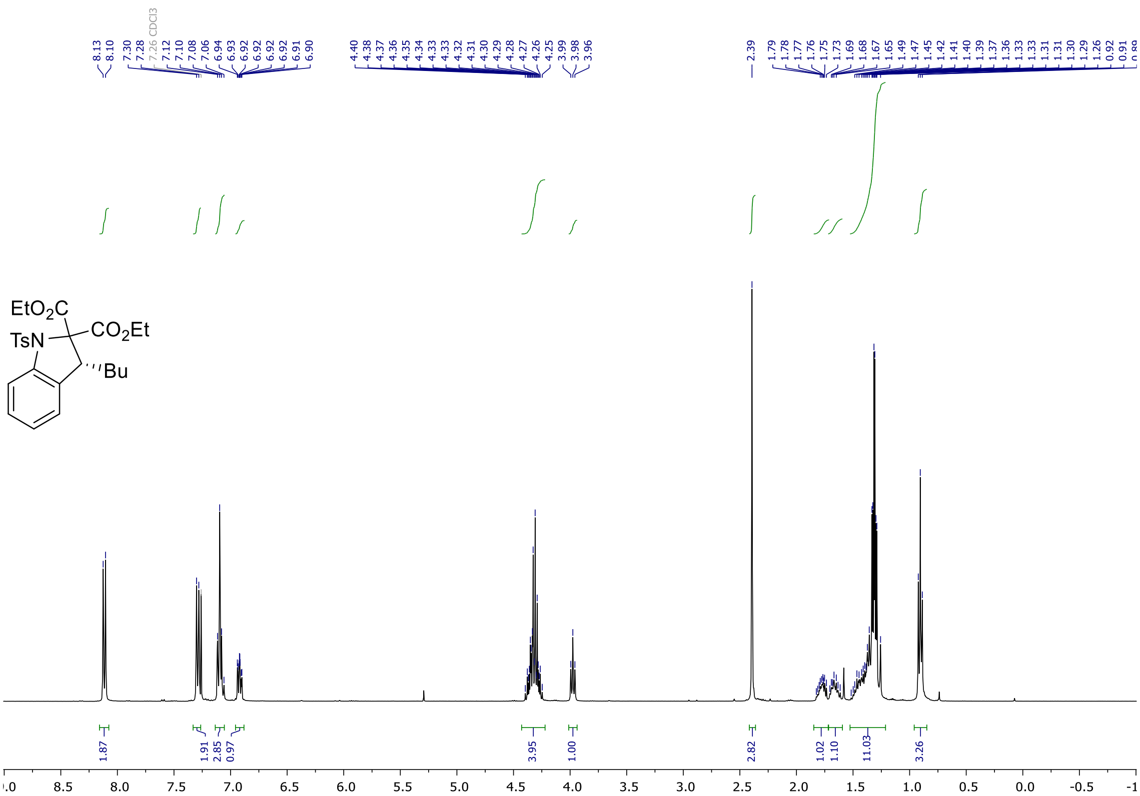


^{13}C NMR (101 MHz, CDCl$_3$)

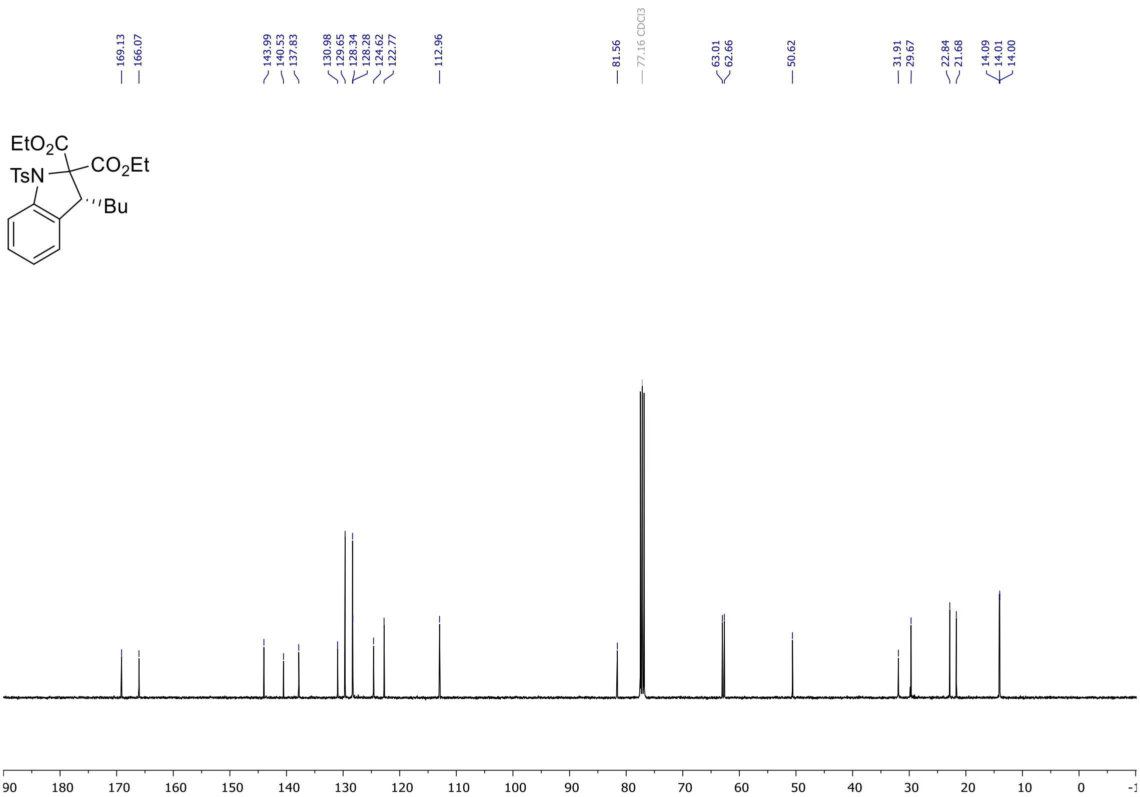


Diethyl (*R*)-3-butyl-1-tosylindoline-2,2-dicarboxylate (3s)

^{1}H NMR (400 MHz, $CDCl_3$)

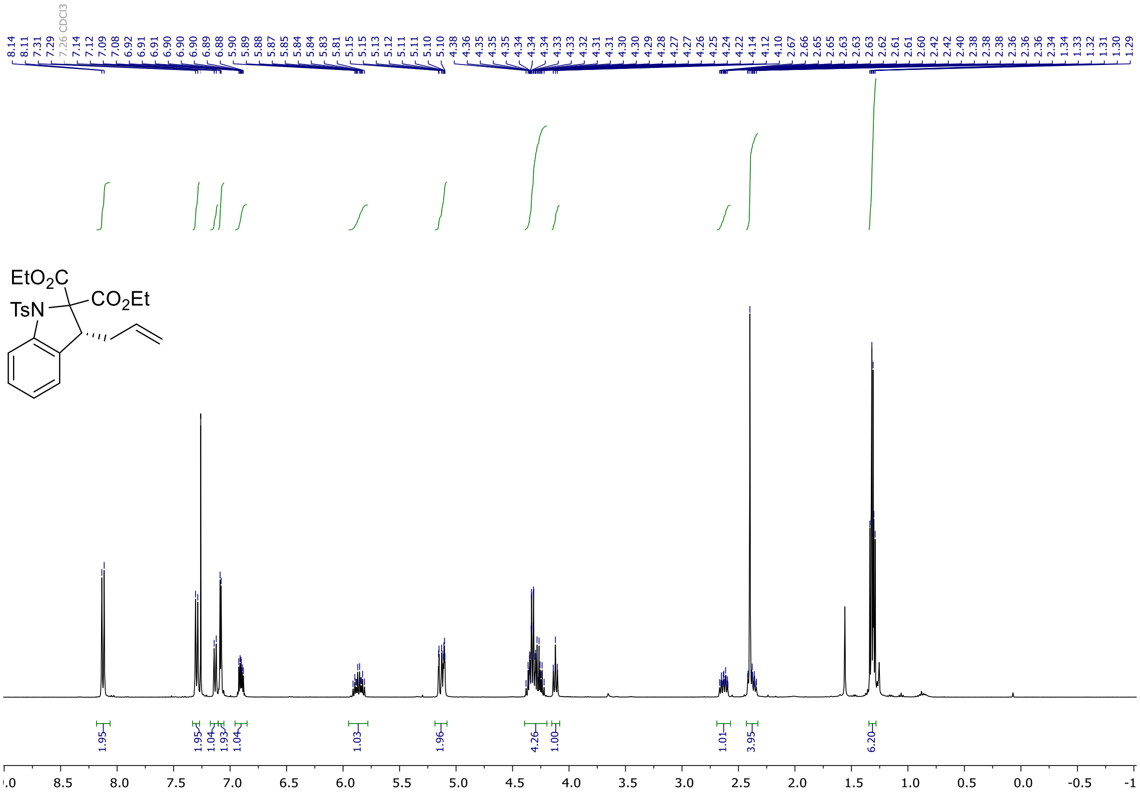


^{13}C NMR (101 MHz, $CDCl_3$)

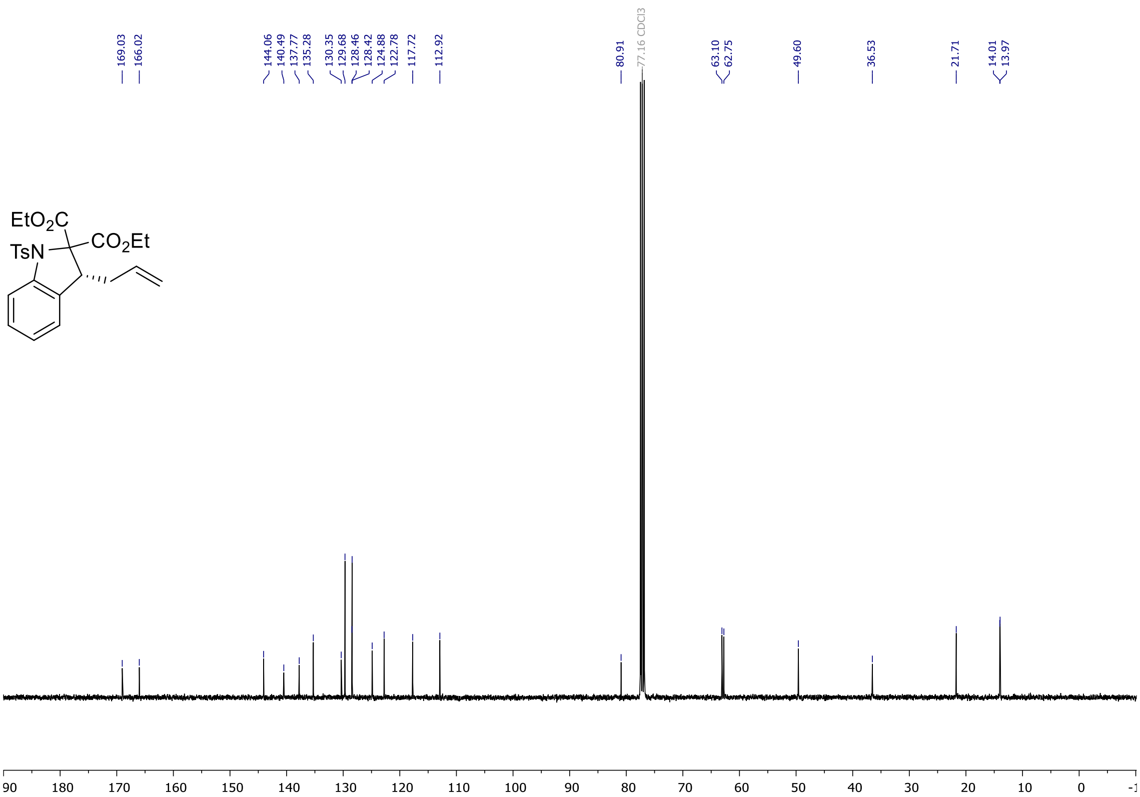


Diethyl (*R*)-3-allyl-1-tosylindoline-2,2-dicarboxylate (3t)

^{1}H NMR (400 MHz, CDCl$_3$)

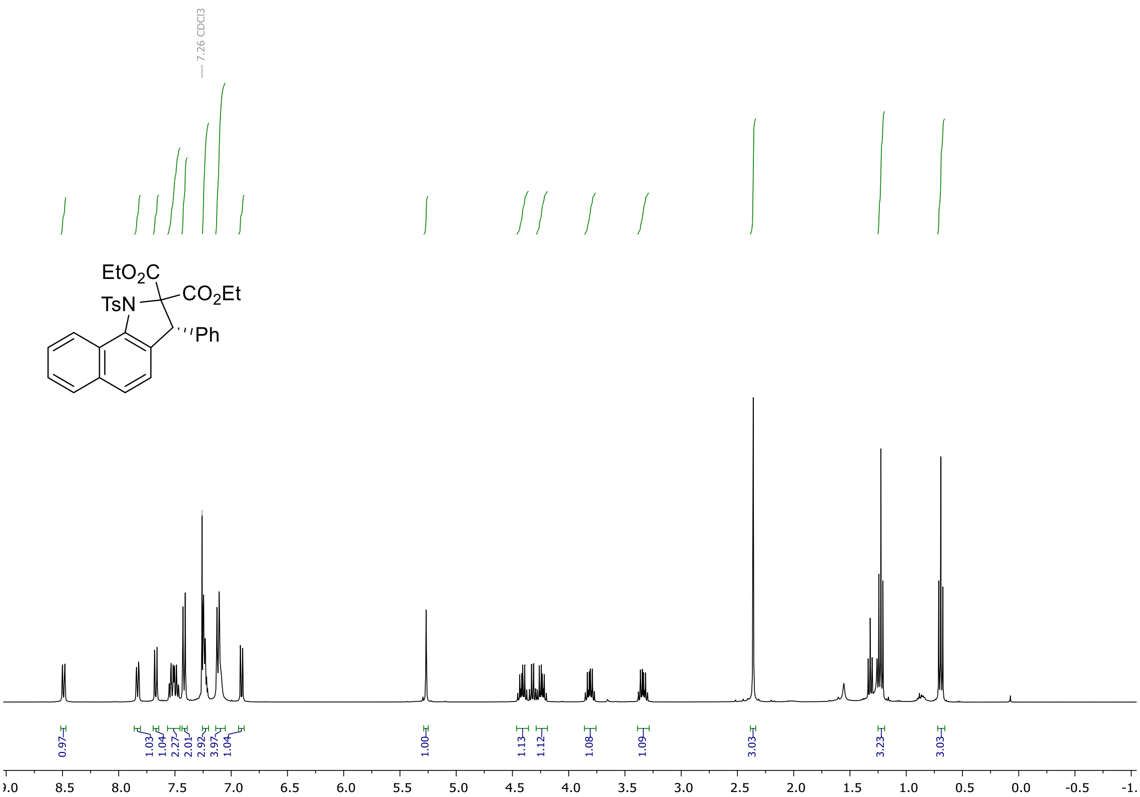


^{13}C NMR (101 MHz, CDCl$_3$)

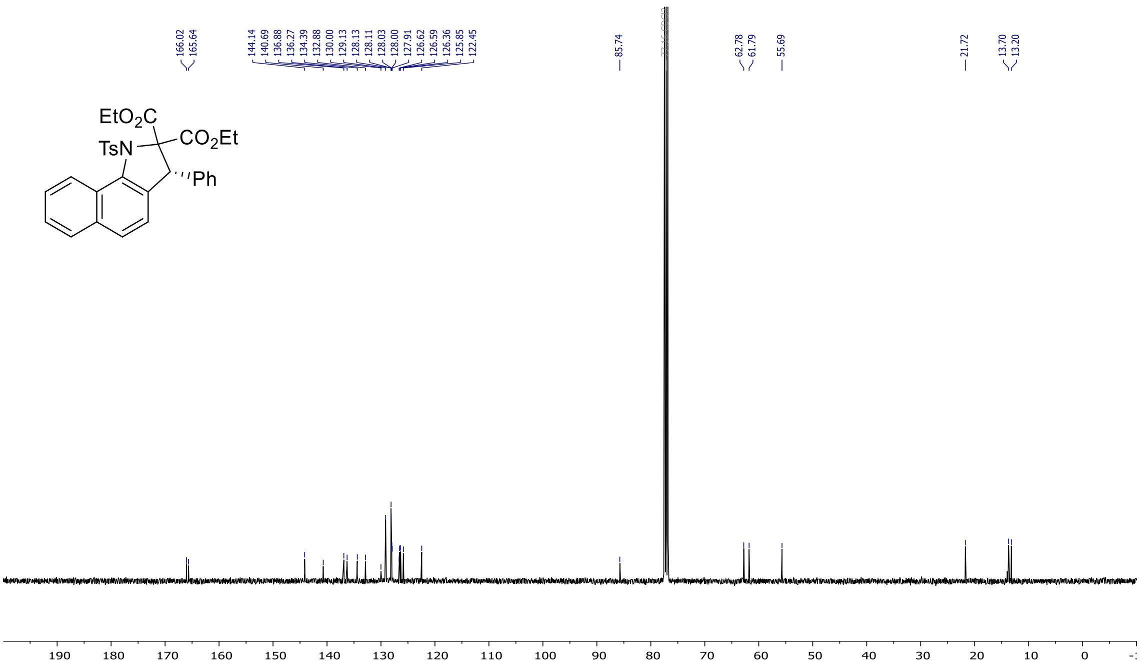


Diethyl (*R*)-3-phenyl-1-tosyl-1,3-dihydro-2*H*-benzo[*g*]indole-2,2-dicarboxylate (3u)

^{1}H NMR (400 MHz, CDCl$_3$)

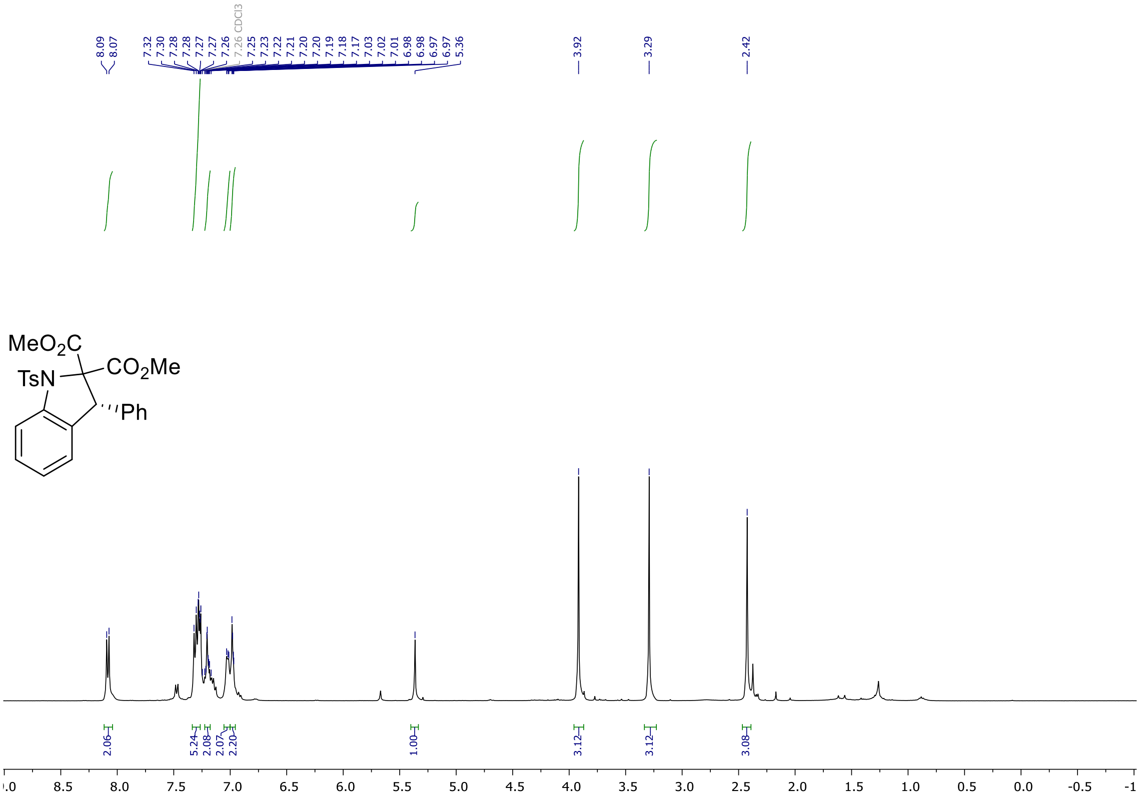


^{13}C NMR (101 MHz, CDCl$_3$)

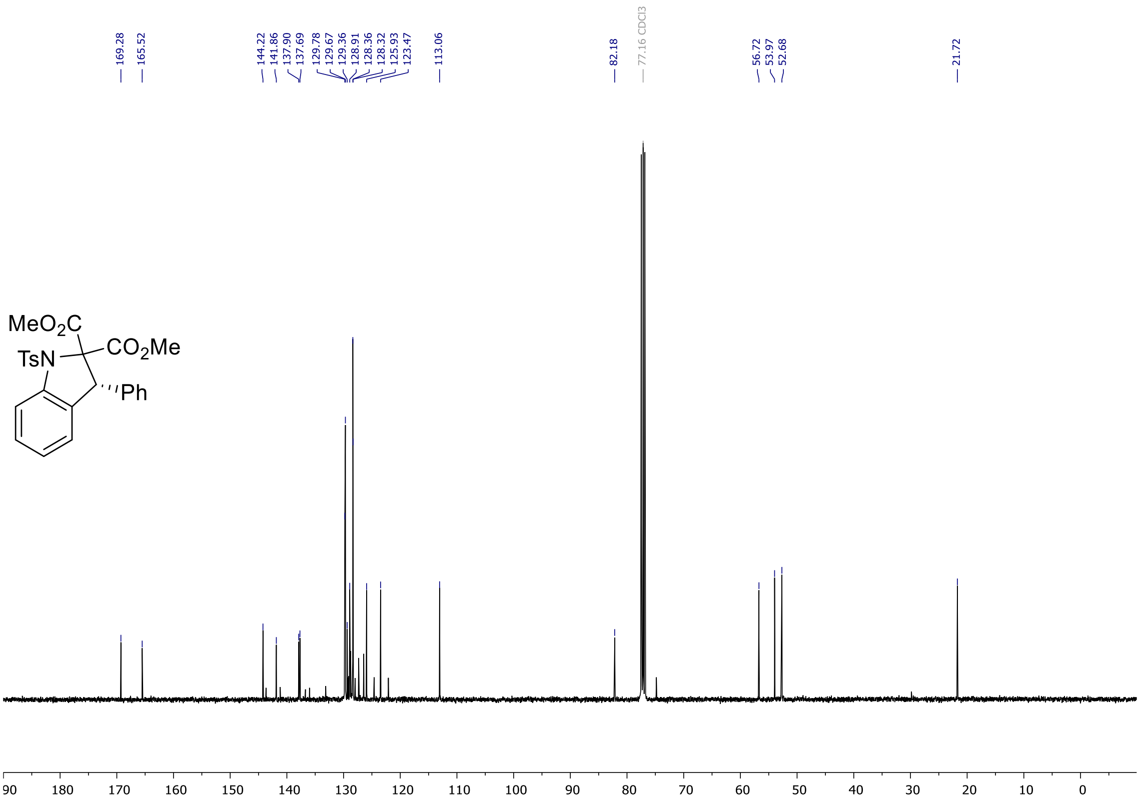


Dimethyl (*R*)-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3v)

^{1}H NMR (400 MHz, $CDCl_3$)

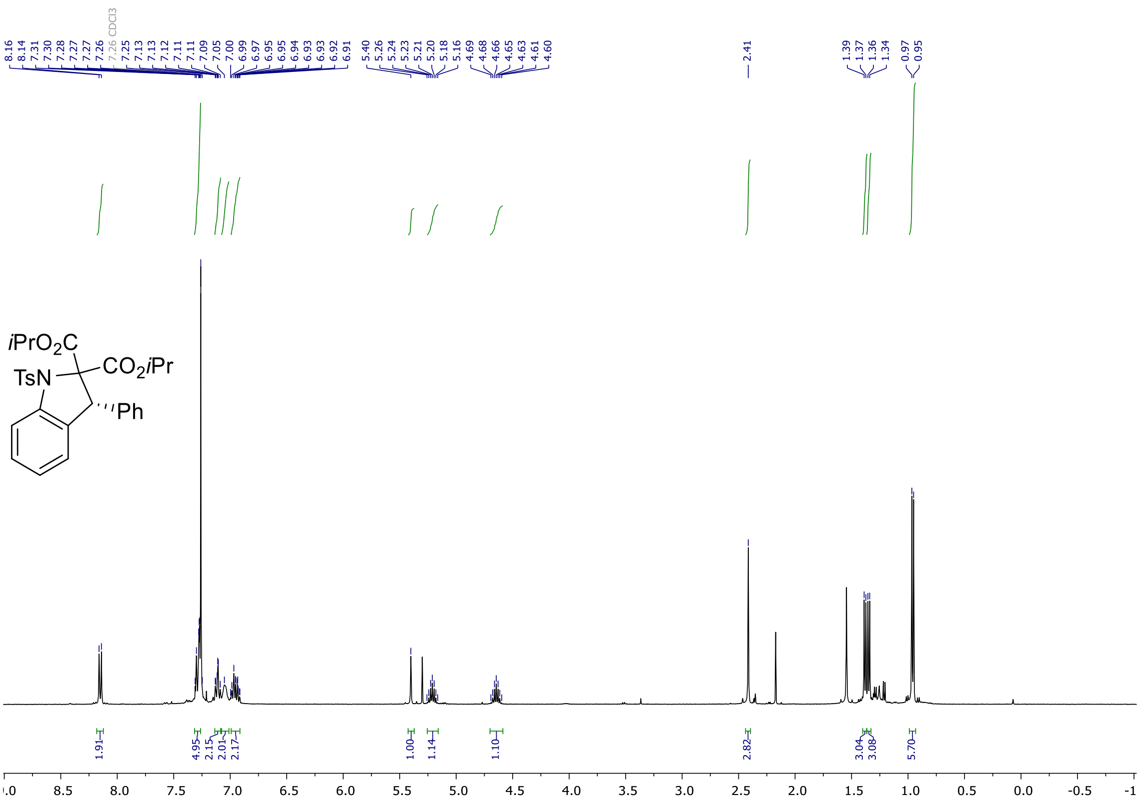


^{13}C NMR (101 MHz, $CDCl_3$)

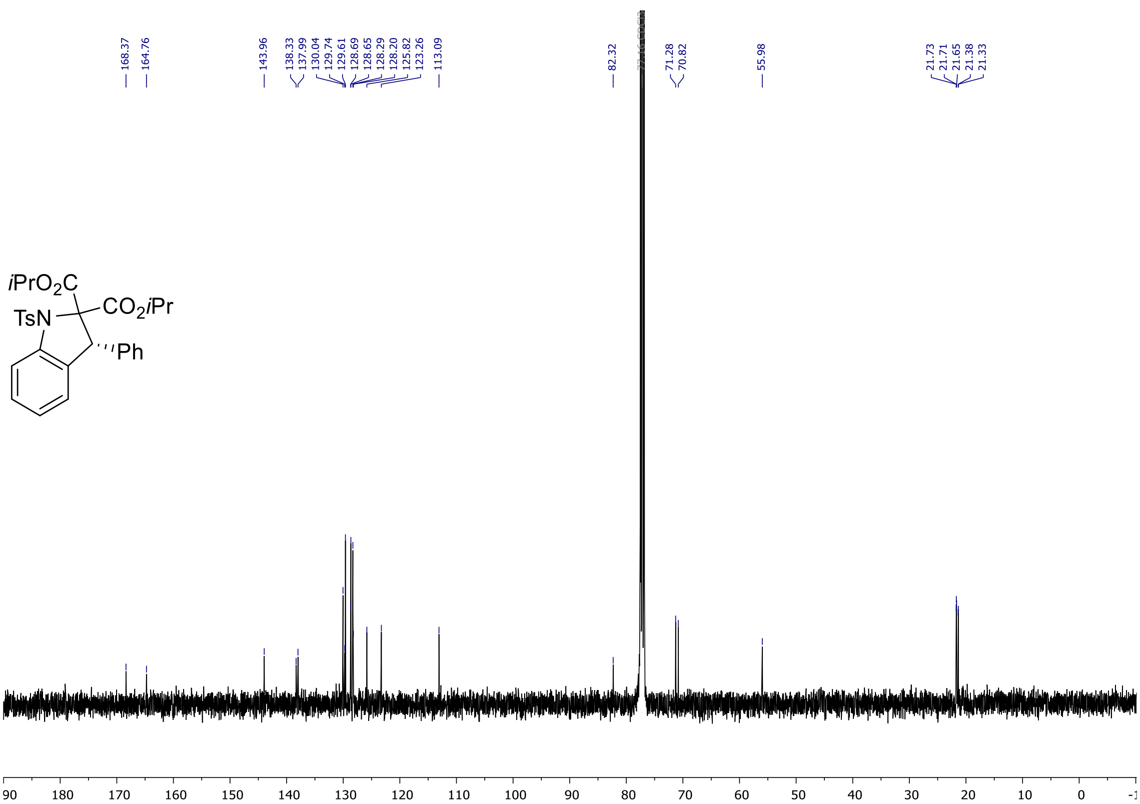


Diisopropyl (*R*)-3-phenyl-1-tosylindoline-2,2-dicarboxylate (3w)

^{1}H NMR (400 MHz, $CDCl_3$)

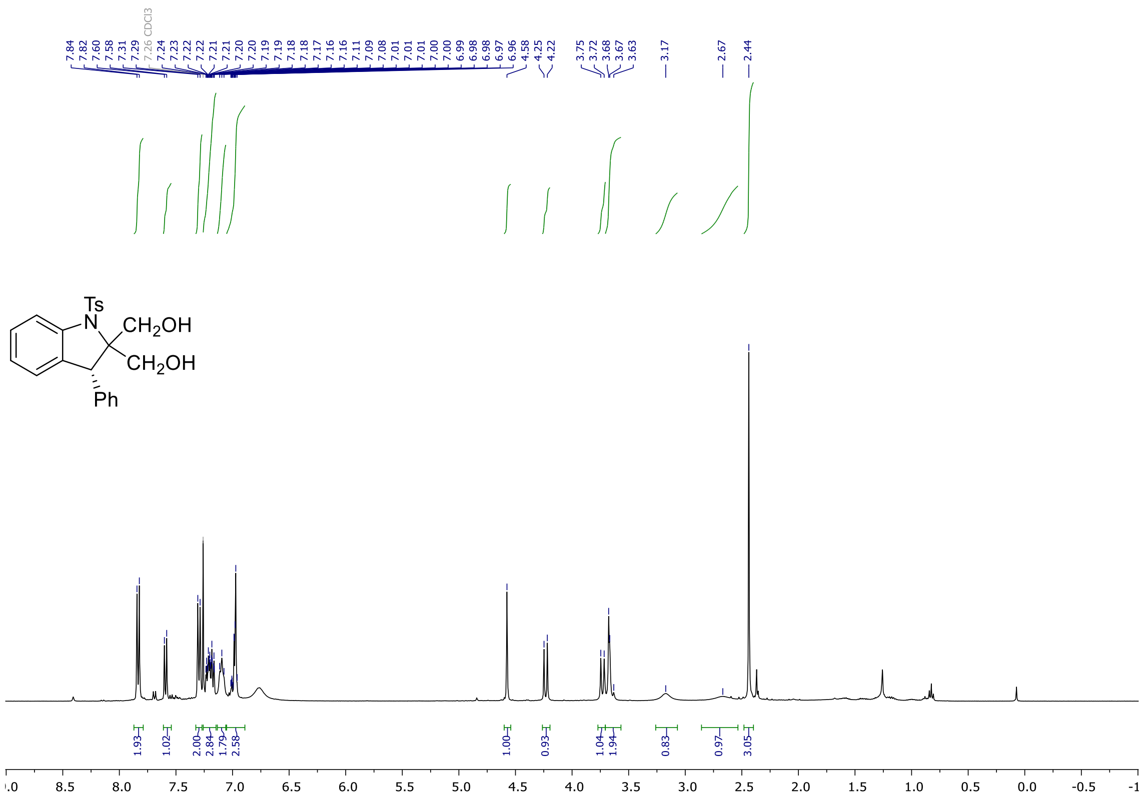


^{13}C NMR (101 MHz, $CDCl_3$)

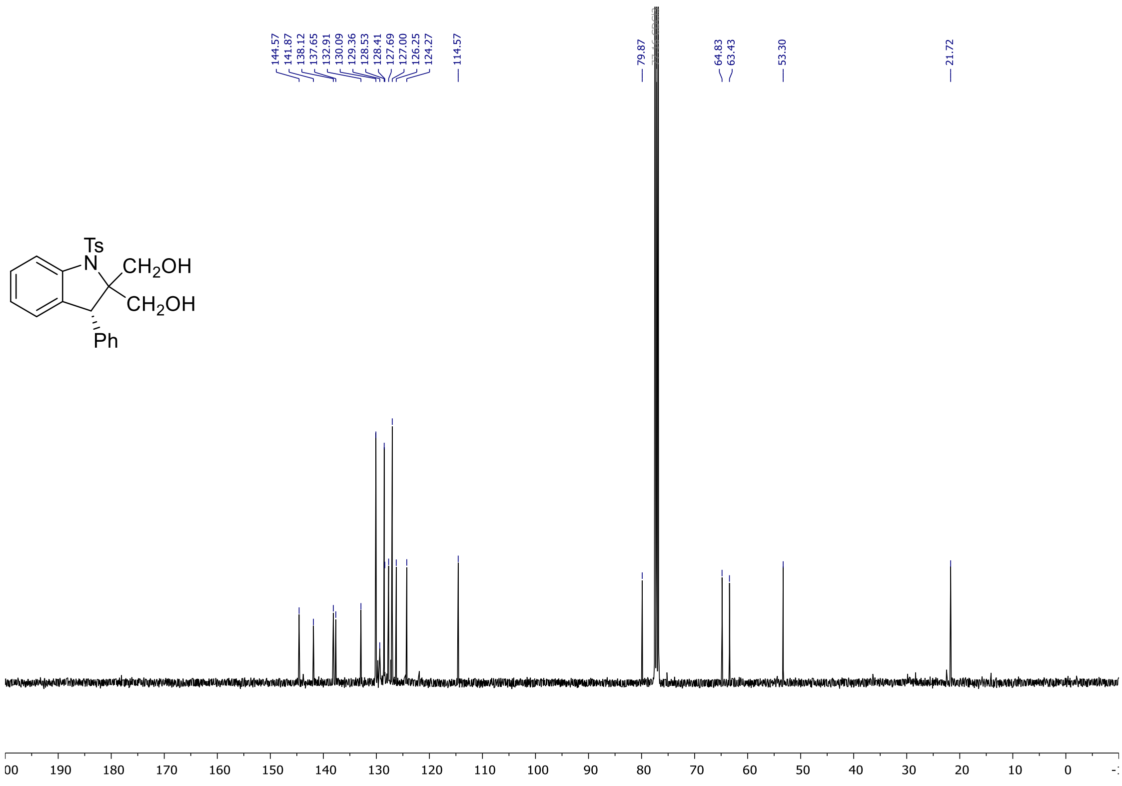


(*R*)-(3-phenyl-1-tosylindoline-2,2-diyl)dimethanol (4)

^{1}H NMR (400 MHz, CDCl$_3$)

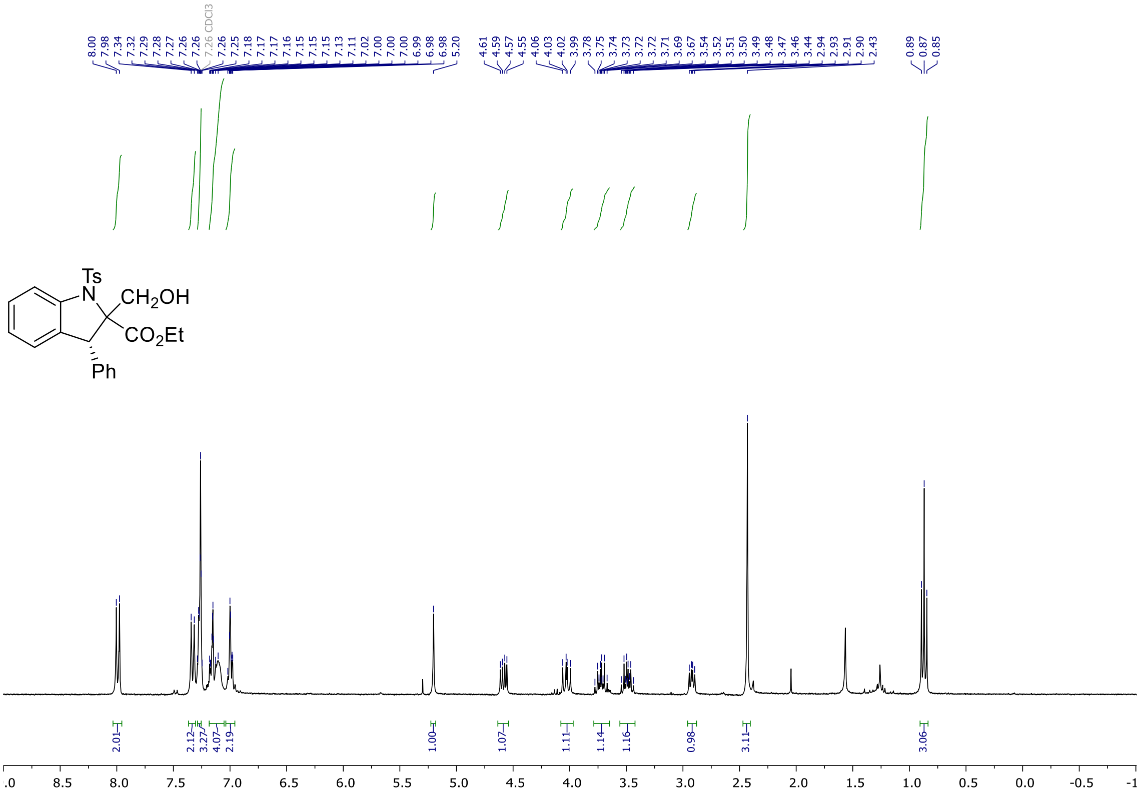


^{13}C NMR (101 MHz, CDCl$_3$)

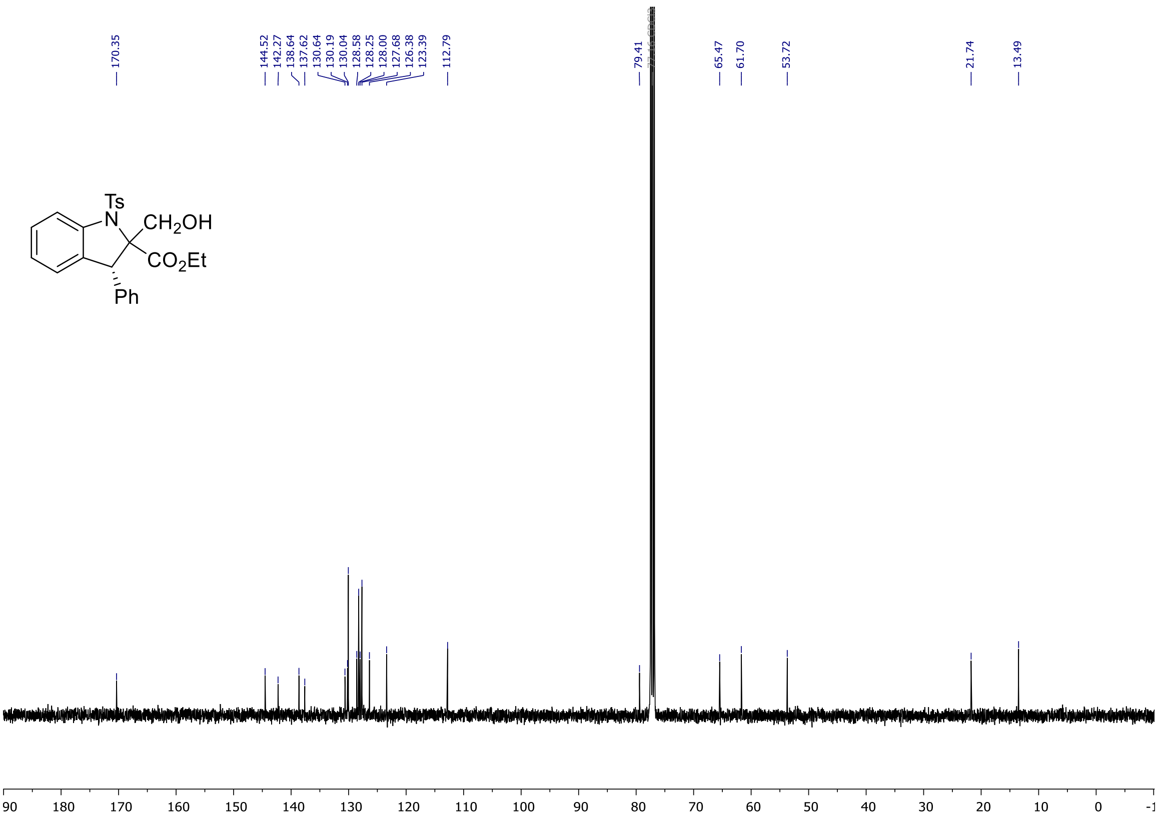


Ethyl (3*R*)-2-(hydroxymethyl)-3-phenyl-1-tosylindoline-2-carboxylate (5)

^{1}H NMR (400 MHz, $CDCl_3$)

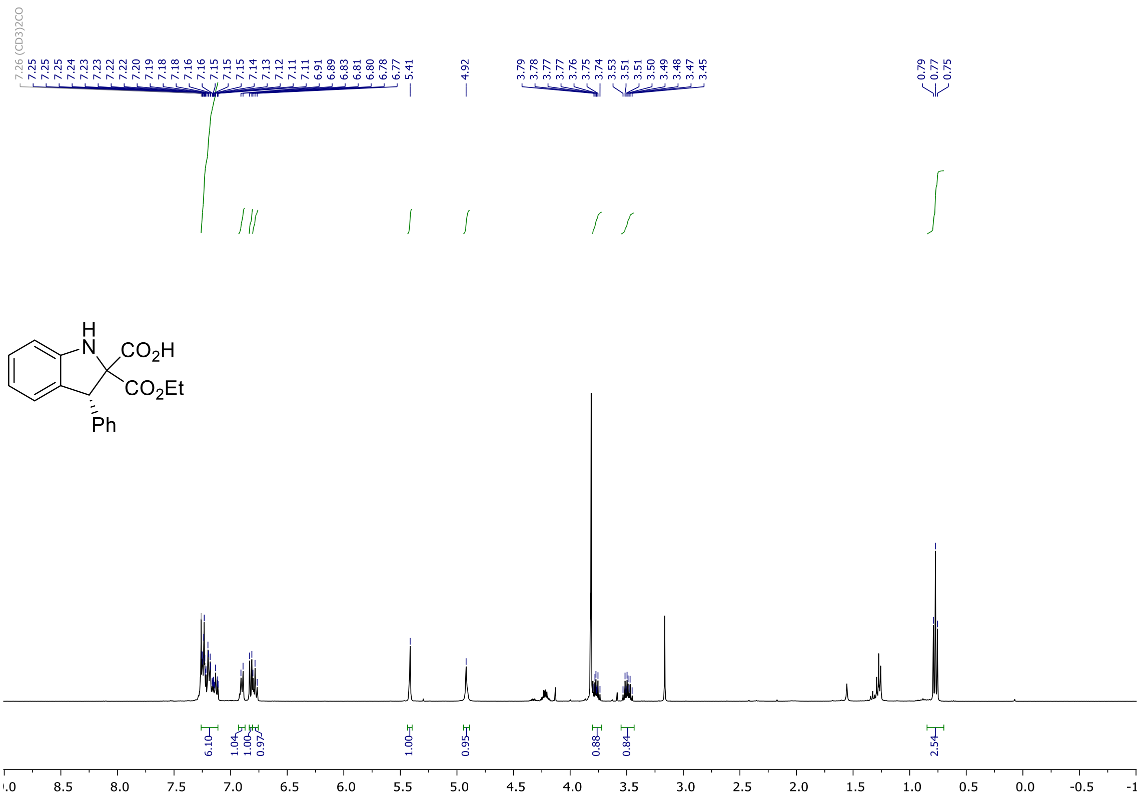


^{13}C NMR (101 MHz, $CDCl_3$)

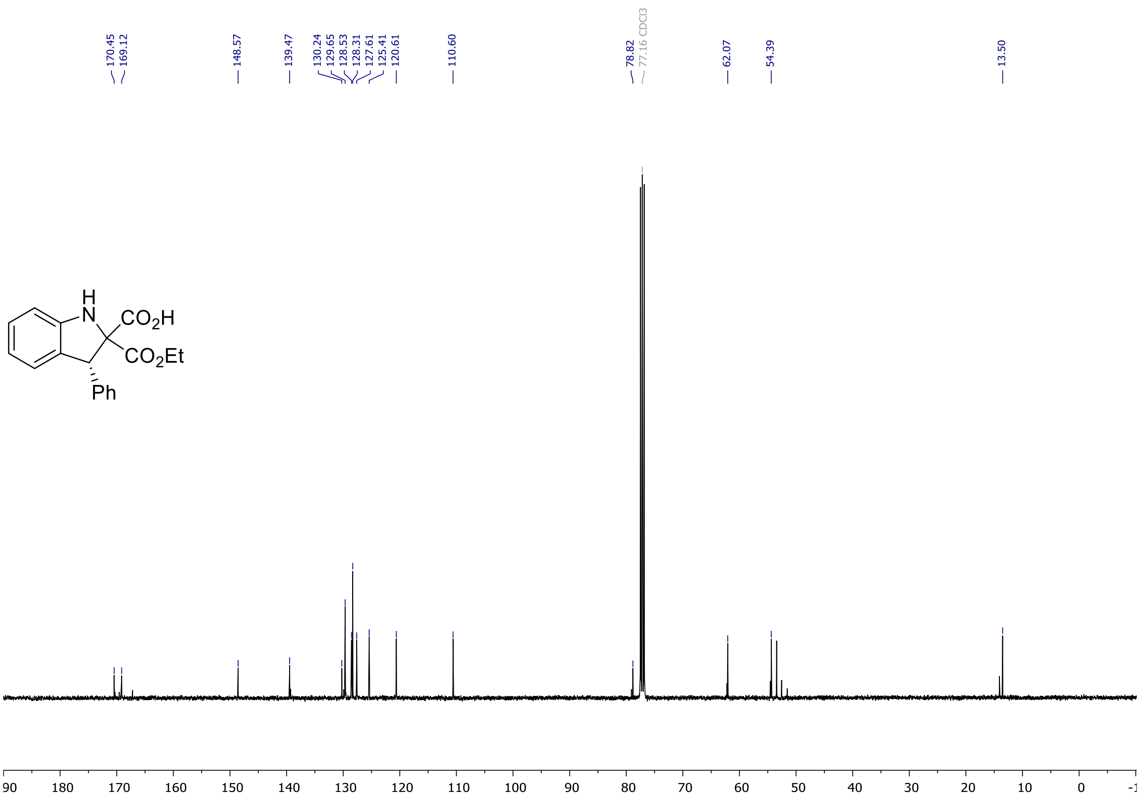


(3*R*)-2-(ethoxycarbonyl)-3-phenylindoline-2-carboxylic acid (6)

^{1}H NMR (400 MHz, $CDCl_3$)

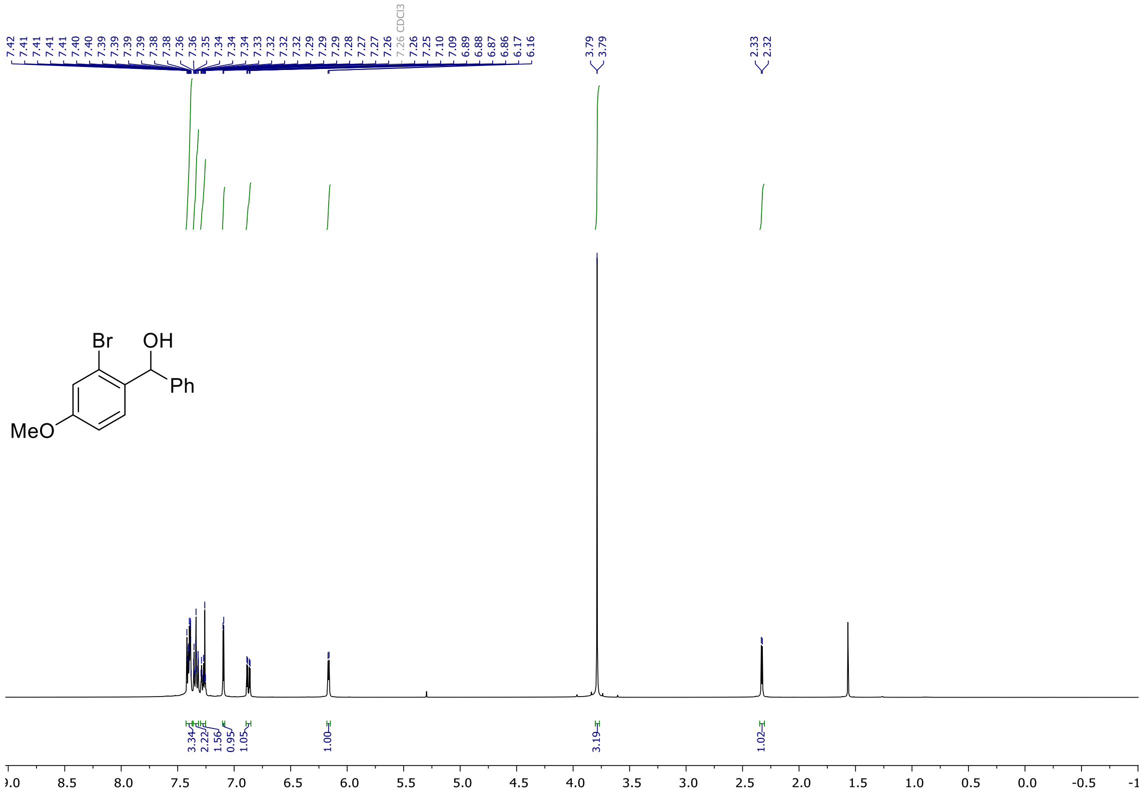


^{13}C NMR (101 MHz, $CDCl_3$)

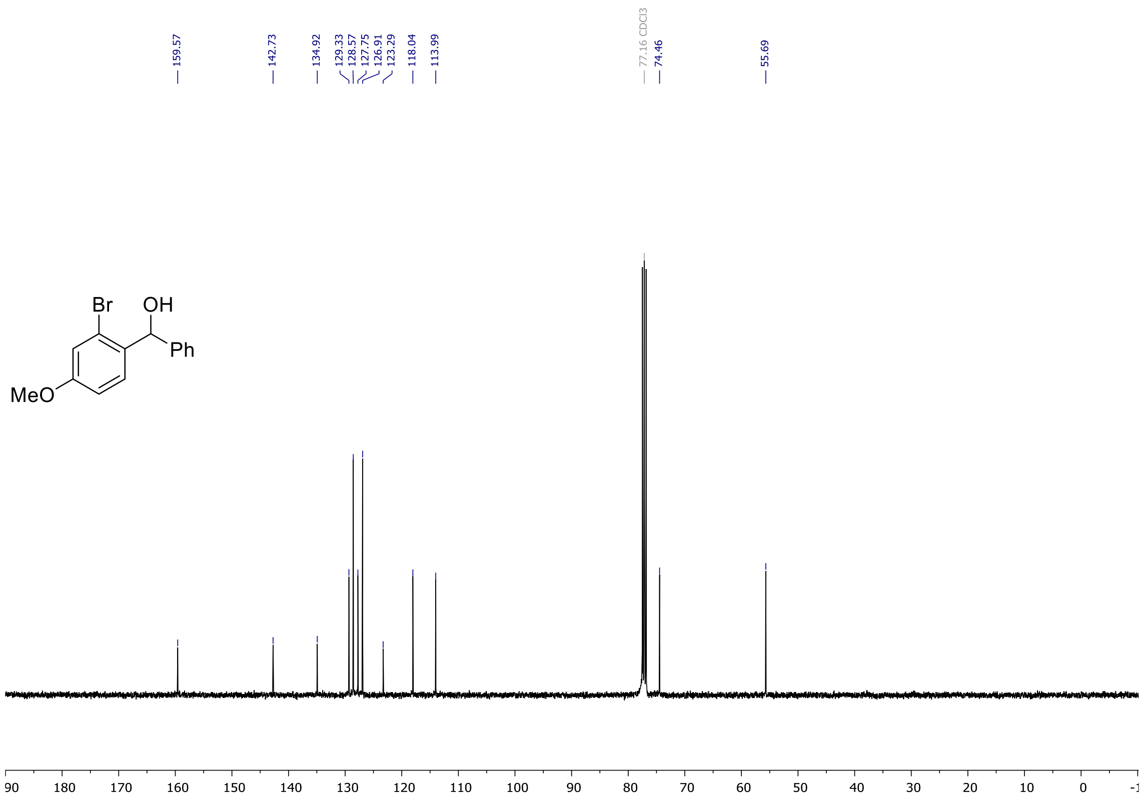


(2-bromo-4-methoxyphenyl)(phenyl)methanol (1c’)

¹H NMR (400 MHz, $CDCl_3$)

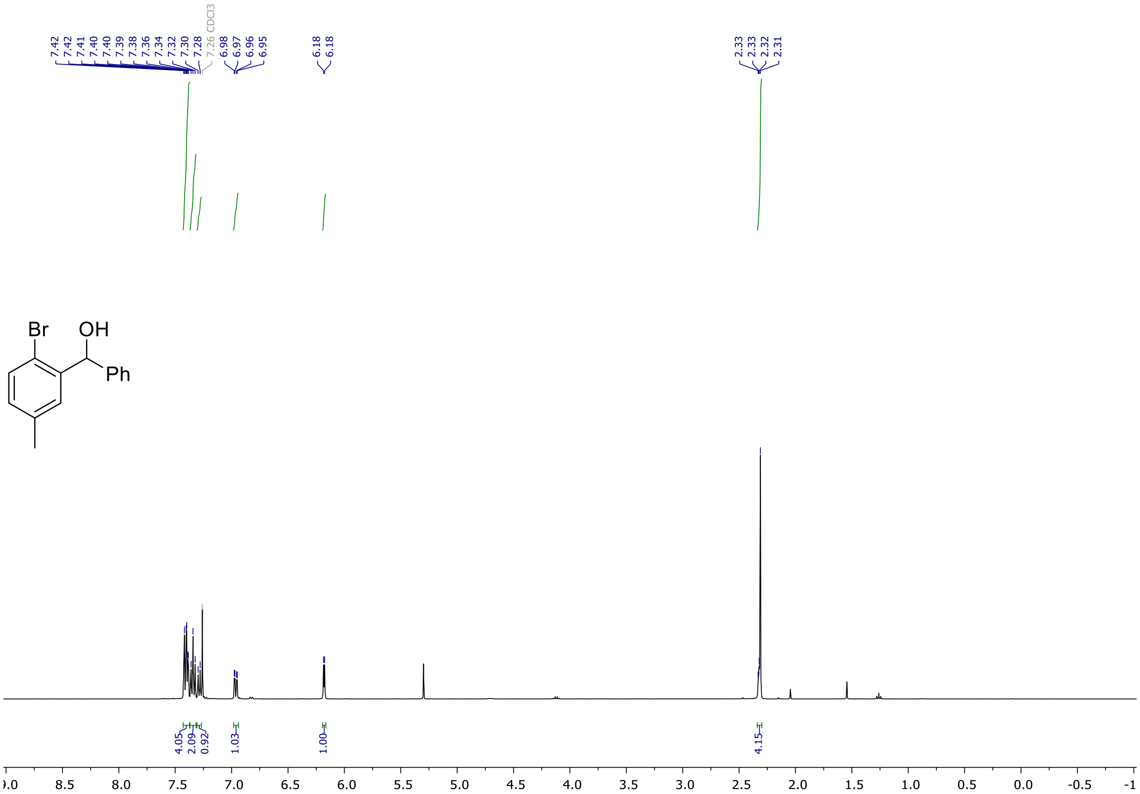


¹³C NMR (101 MHz, $CDCl_3$)

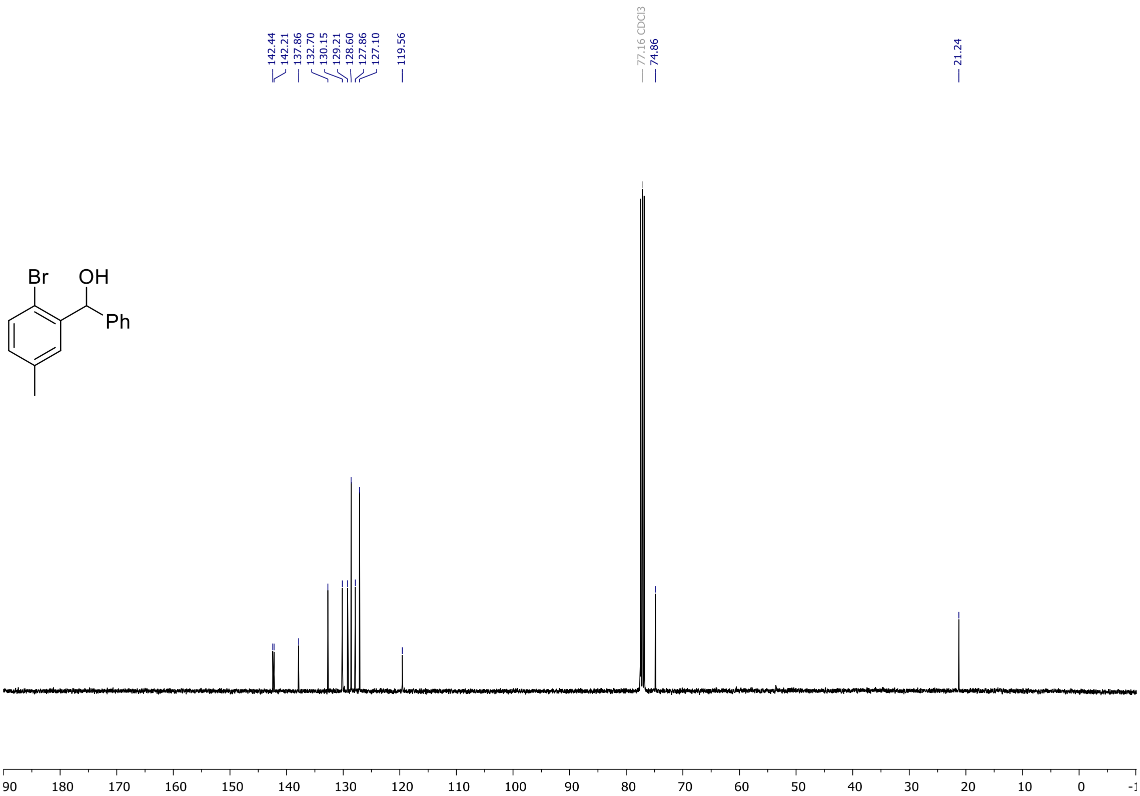


(2-bromo-5-methylphenyl)(phenyl)methanol (1d’)

^{1}H NMR (400 MHz, $CDCl_3$)

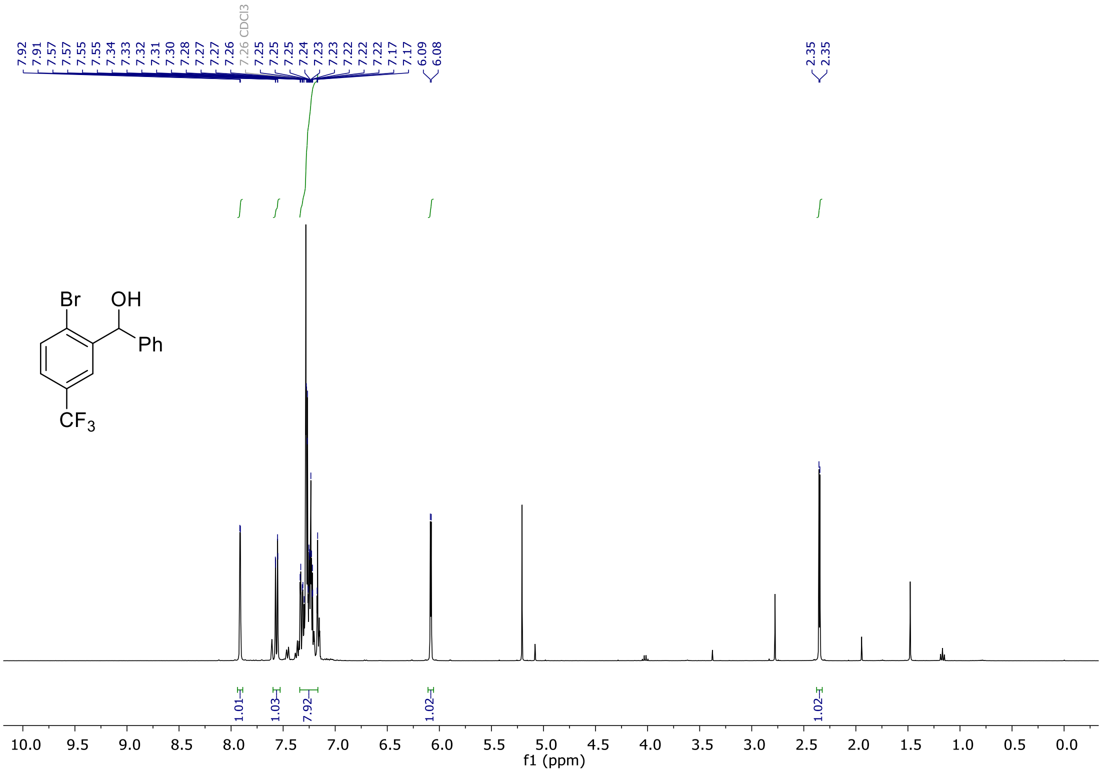


^{13}C NMR (101 MHz, $CDCl_3$)

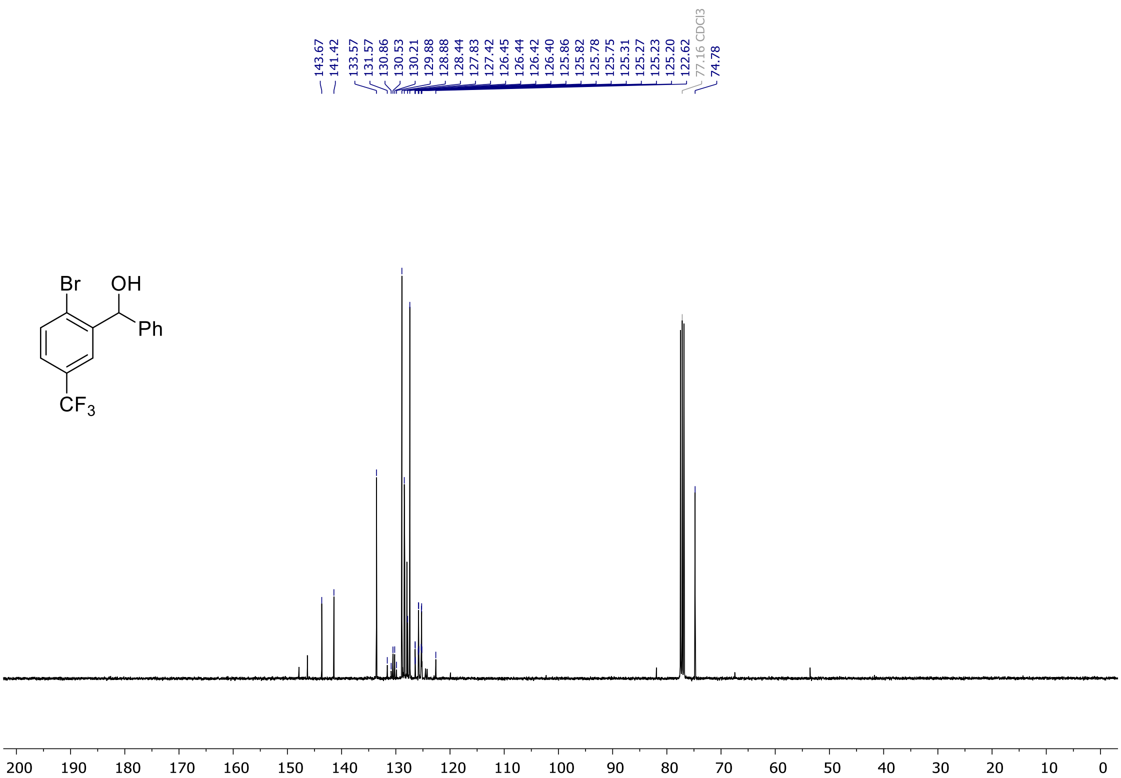


(2-bromo-5-(trifluoromethyl)phenyl)(phenyl)methanol (1m')

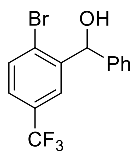
^{1}H RMN (400 MHz, $CDCl_3$)

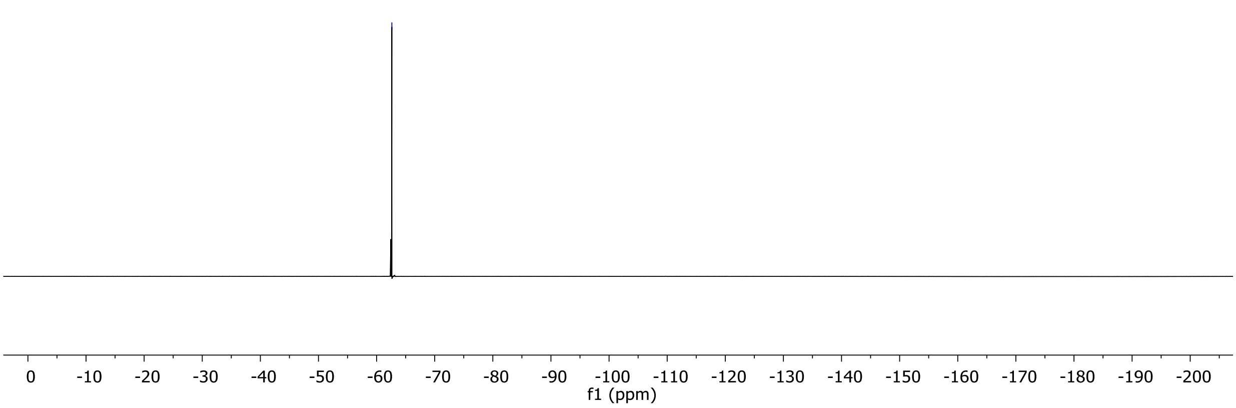


^{13}C RMN (101 MHz, $CDCl_3$)



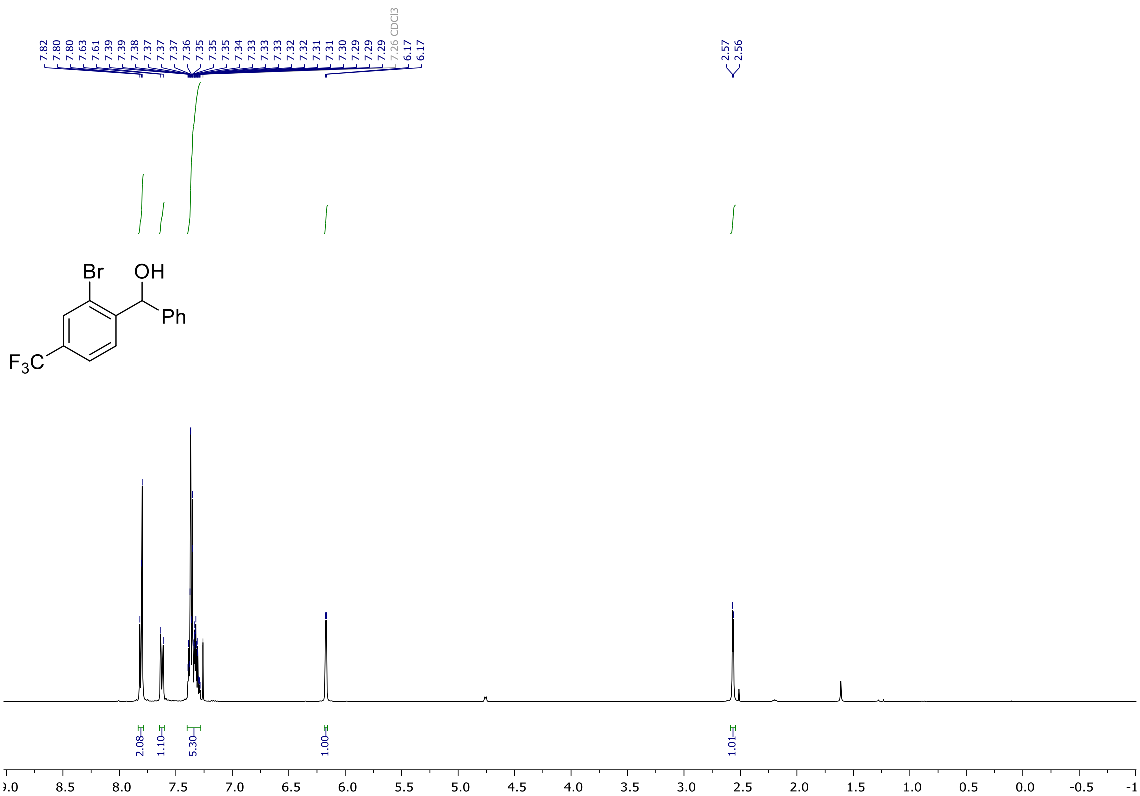
^{19}F NMR (376 MHz, $CDCl_3$)



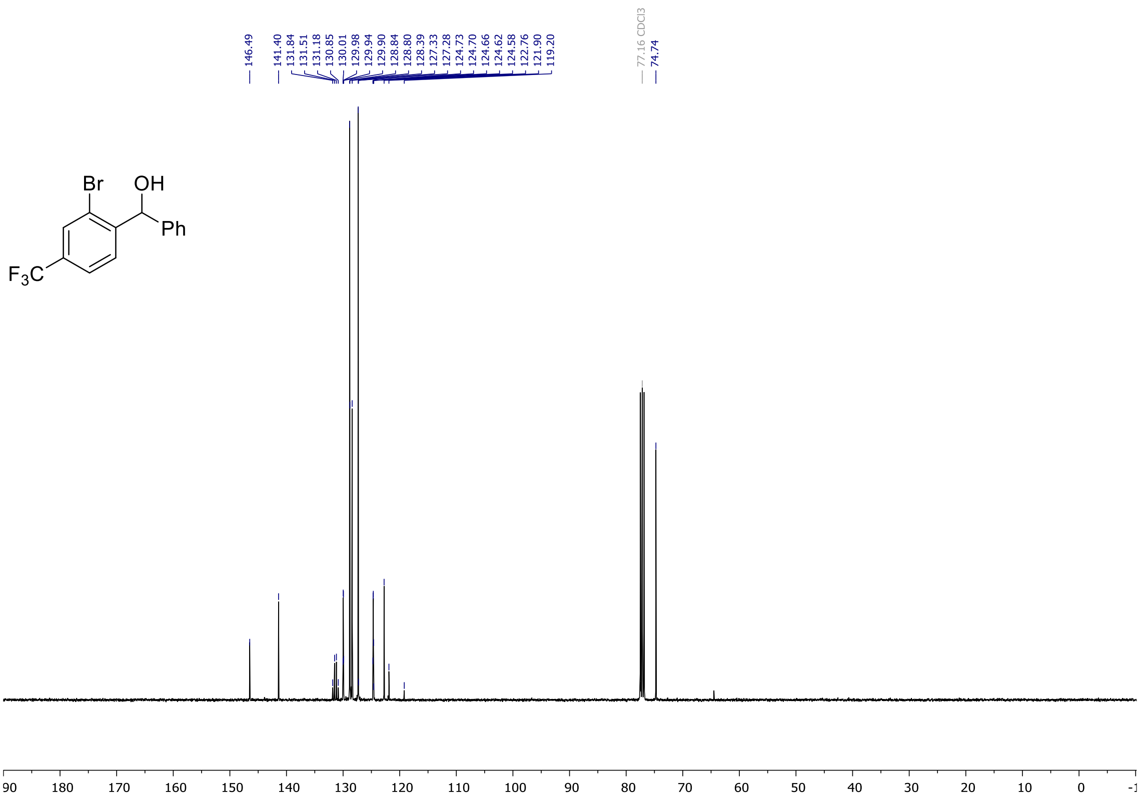


(2-bromo-4-(trifluoromethyl)phenyl)(phenyl)methanol (1n')

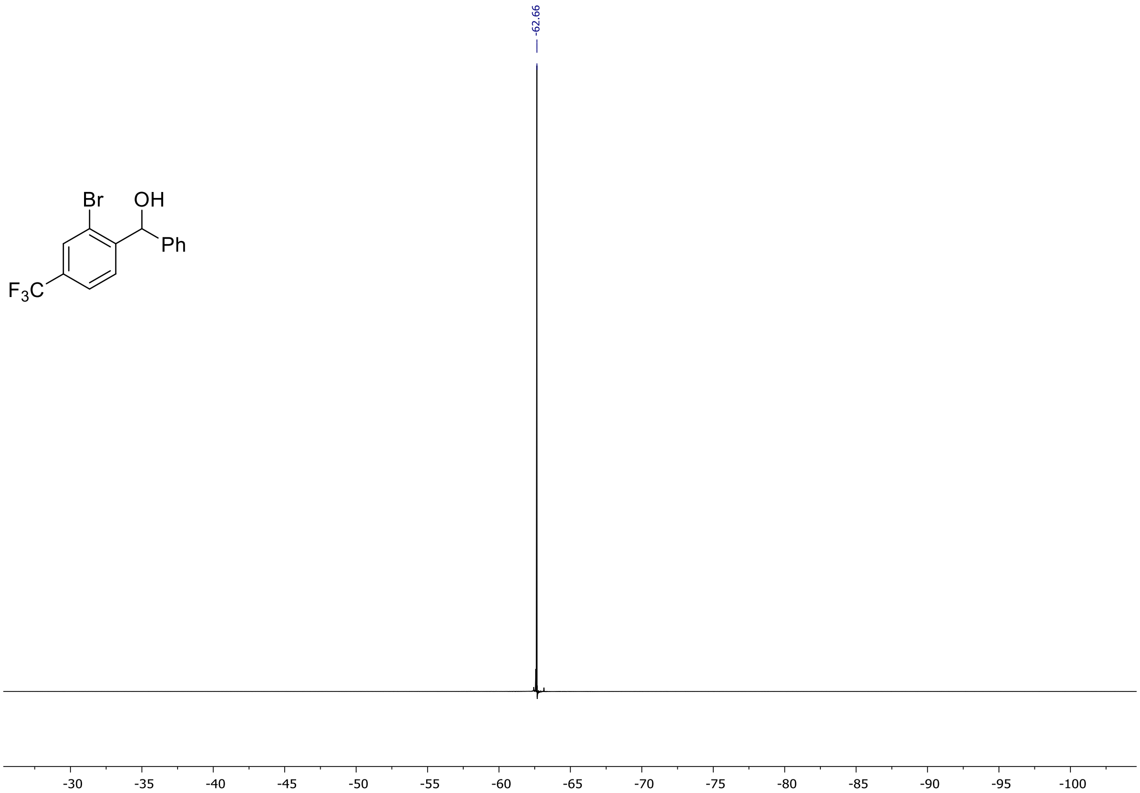
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

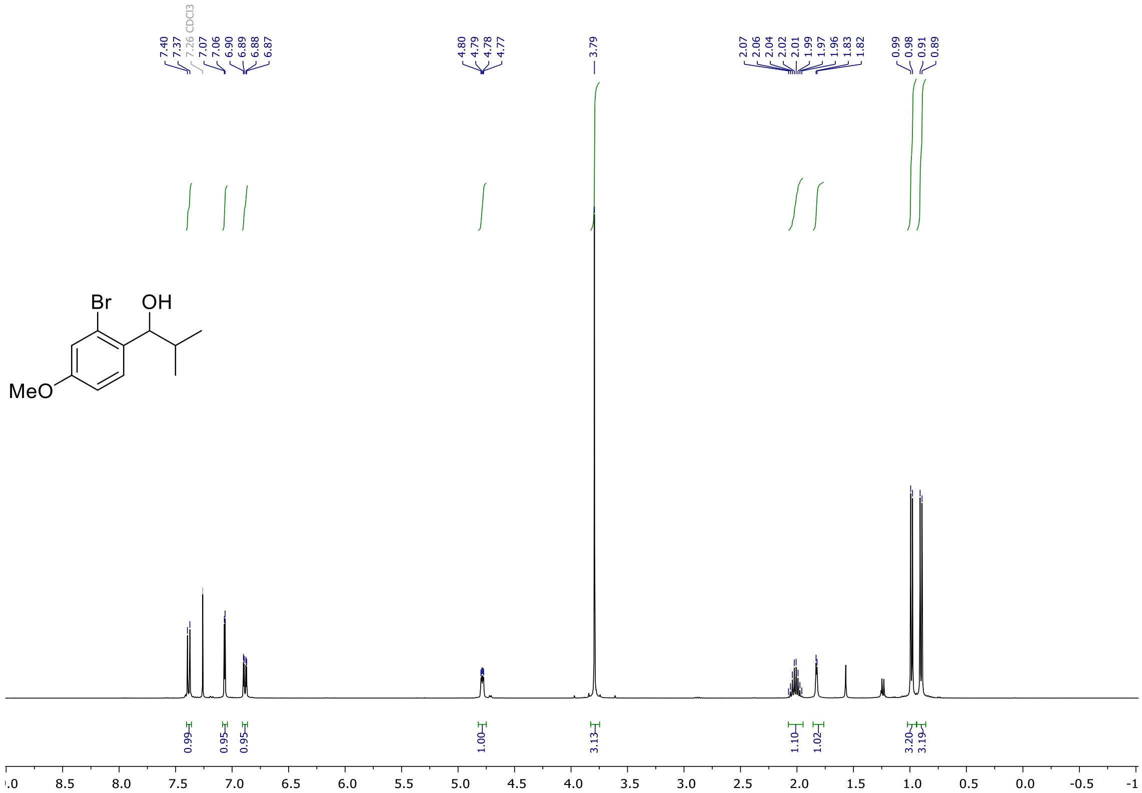


^{19}F NMR (376 MHz, $CDCl_3$)

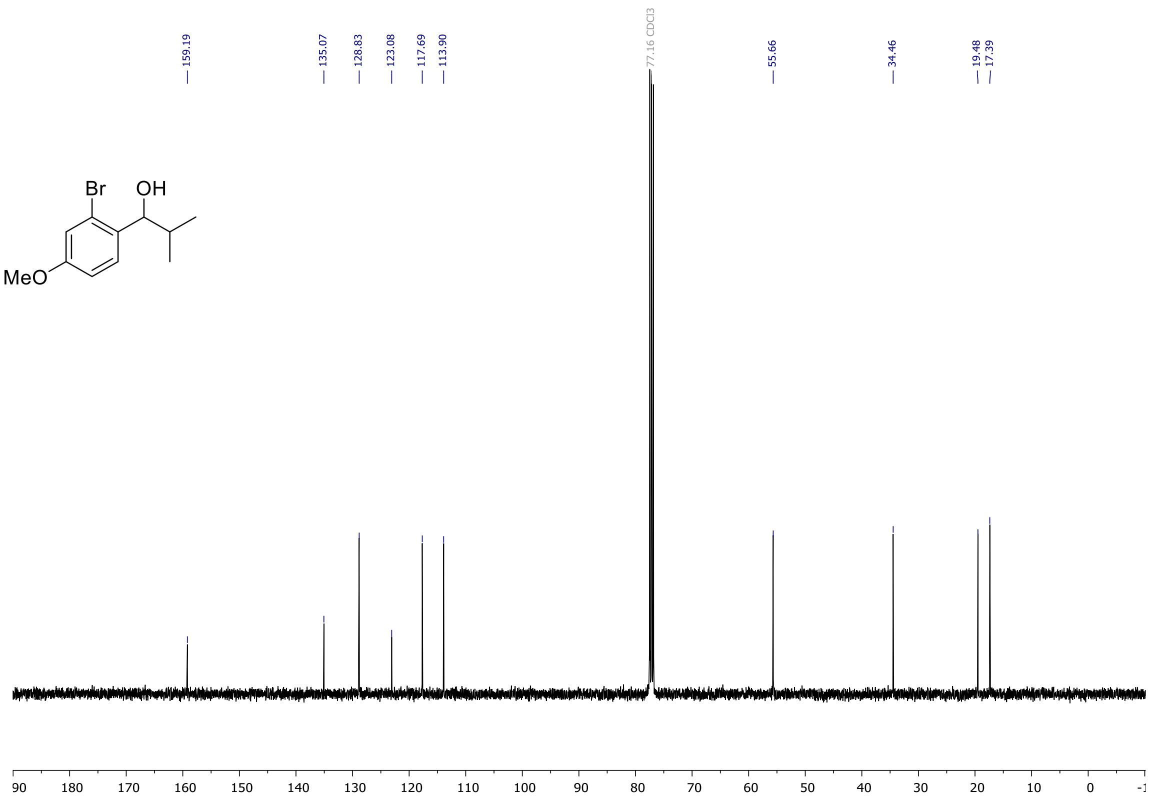


1-(2-bromo-4-methoxyphenyl)-2-methylpropan-1-ol (1q’)

^{1}H NMR (400 MHz, $CDCl_3$)

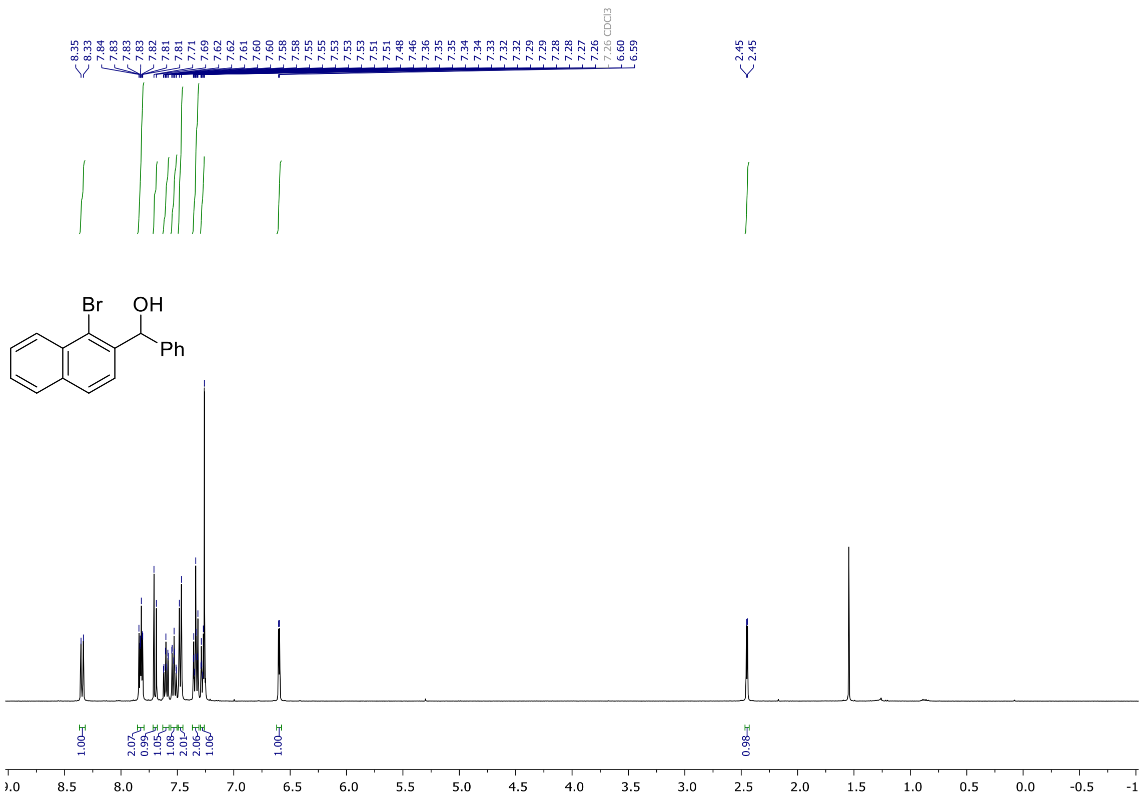


^{13}C NMR (101 MHz, $CDCl_3$)

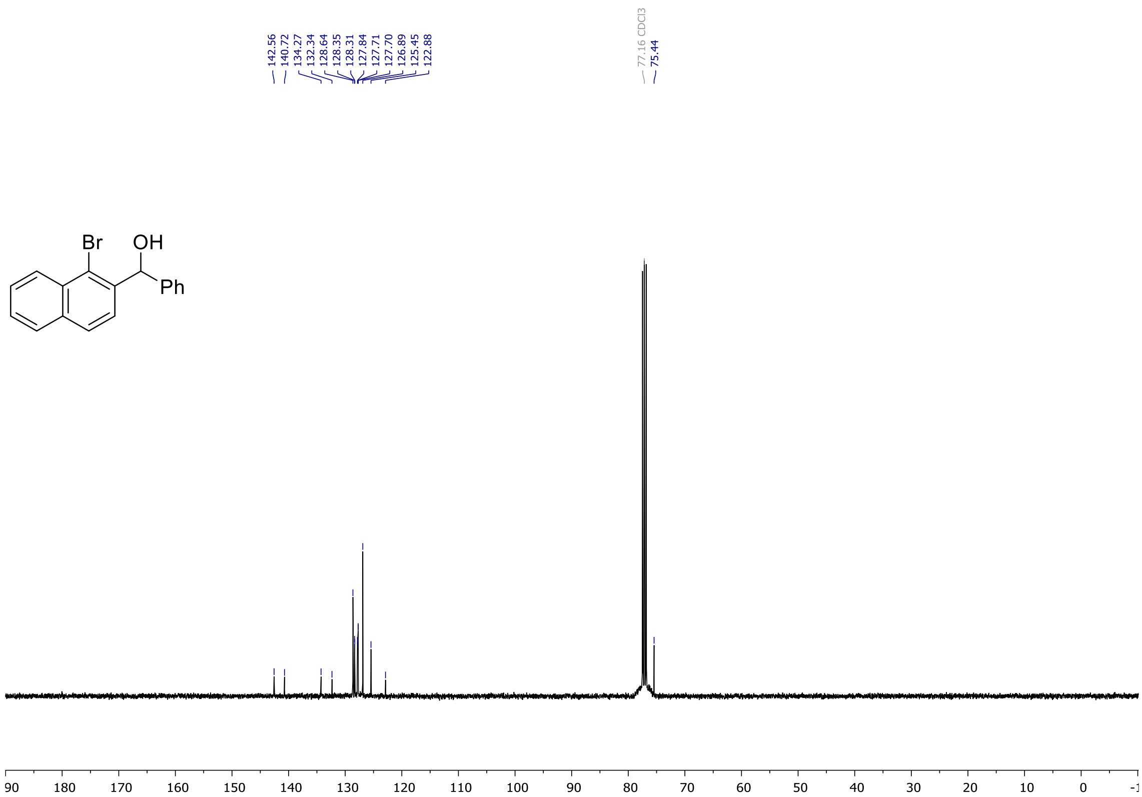


(1-bromonaphthalen-2-yl)(phenyl)methanol (1u')

^{1}H NMR (400 MHz, CDCl$_3$)

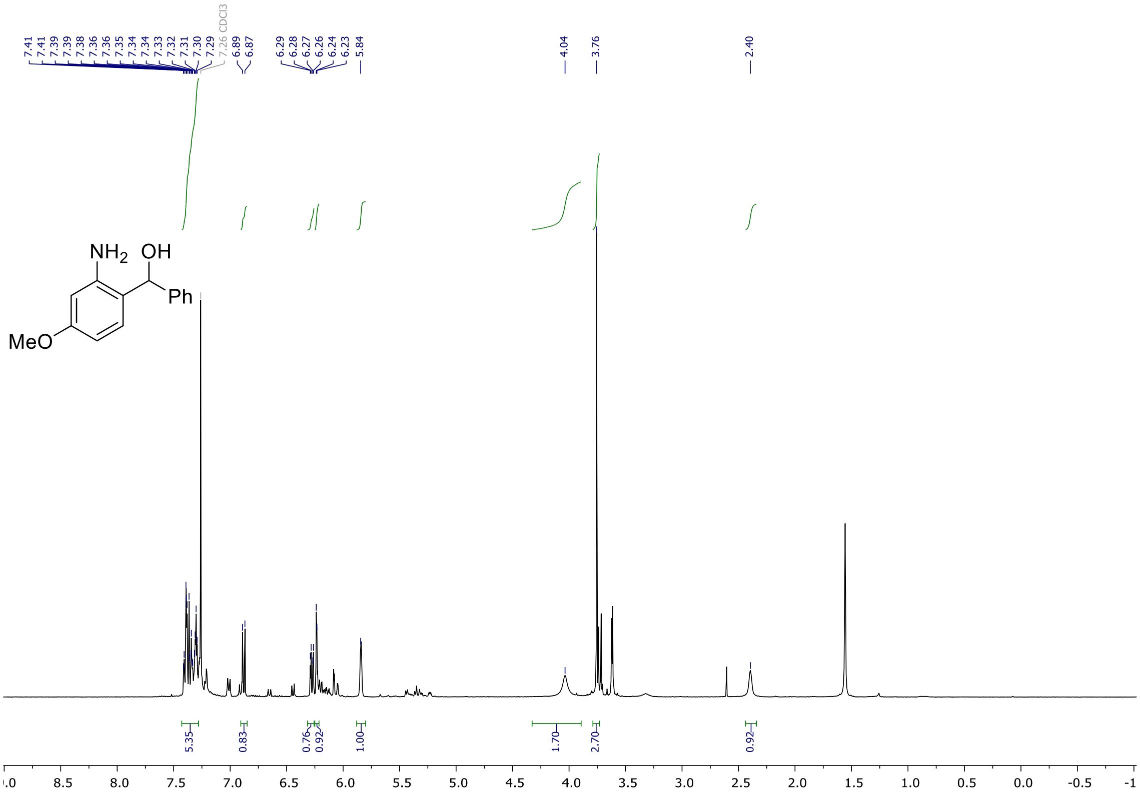


^{13}C NMR (101 MHz, CDCl$_3$)

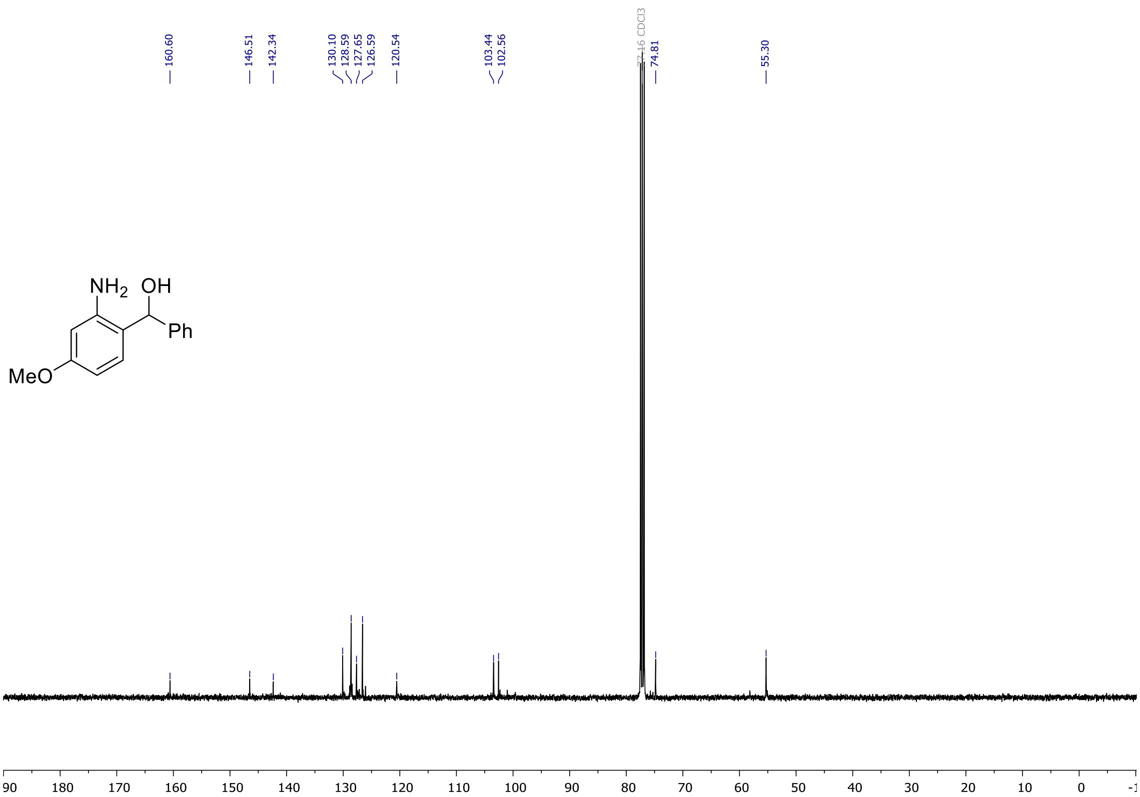


(2-amino-4-methoxyphenyl)(phenyl)methanol (1c")

^{1}H NMR (400 MHz, $CDCl_3$)

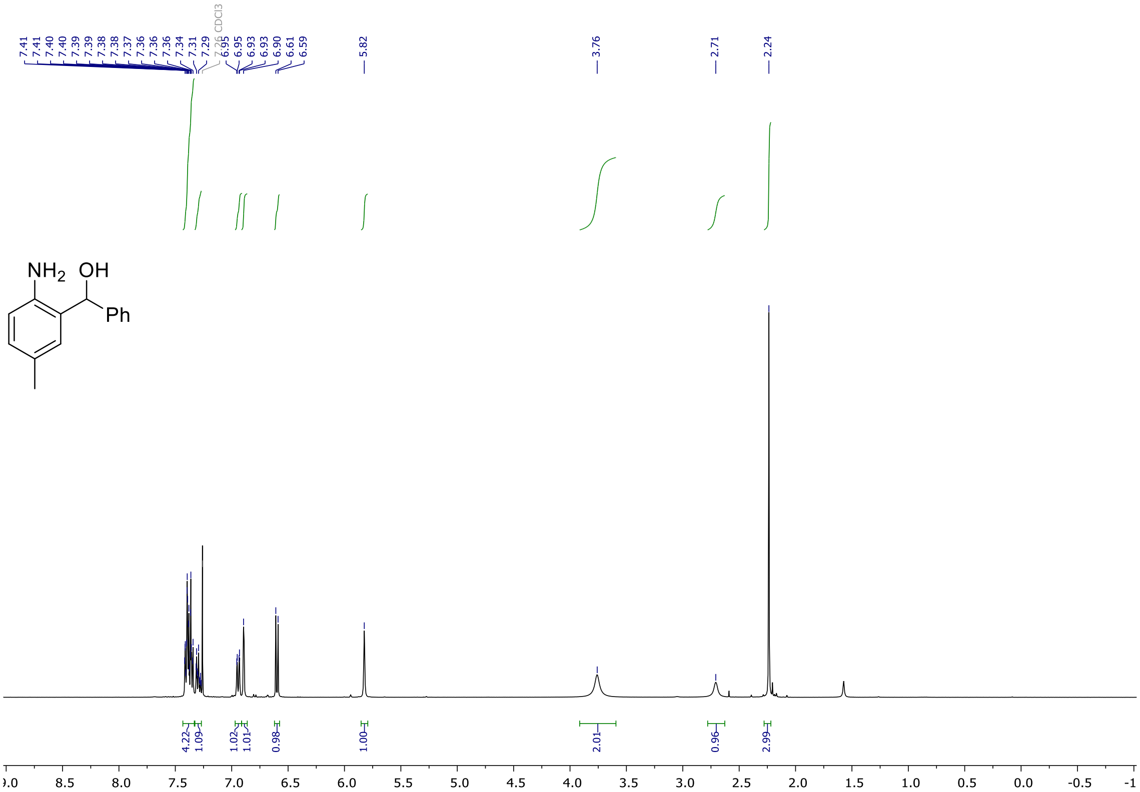


^{13}C NMR (101 MHz, $CDCl_3$)

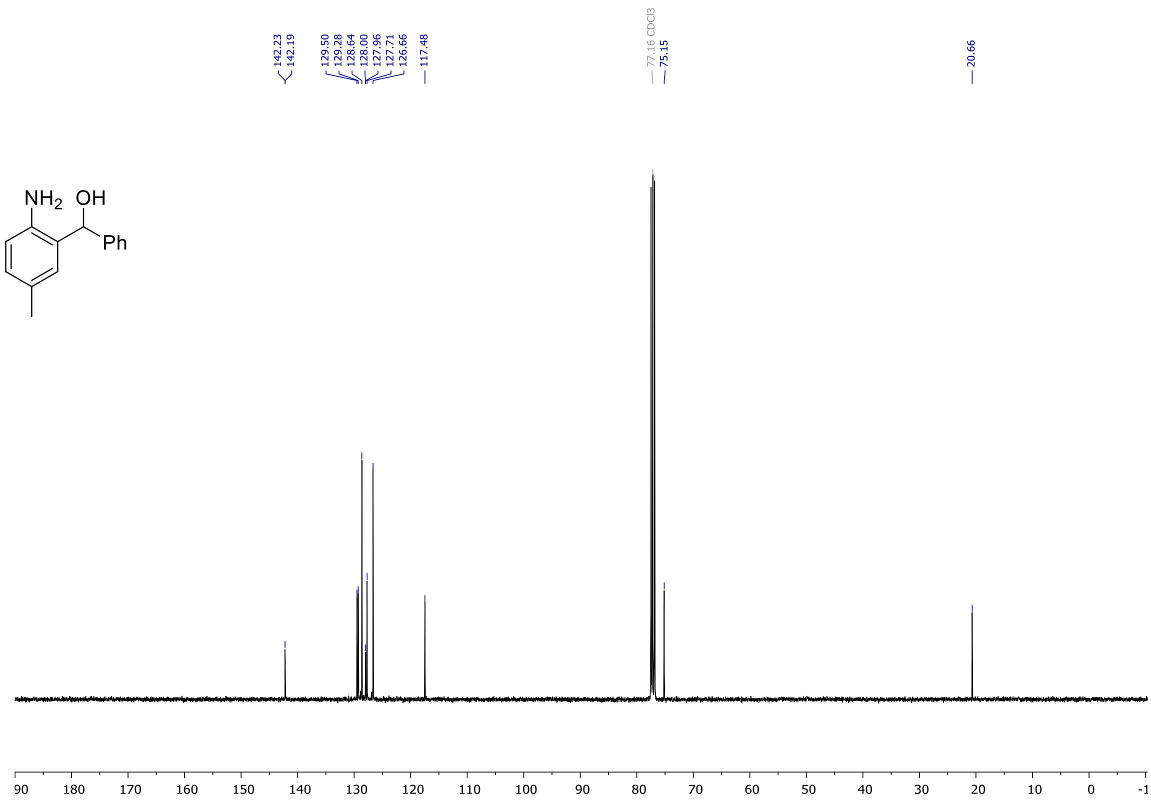


(2-amino-5-methylphenyl)(phenyl)methanol (1d'')

^{1}H NMR (400 MHz, $CDCl_3$)

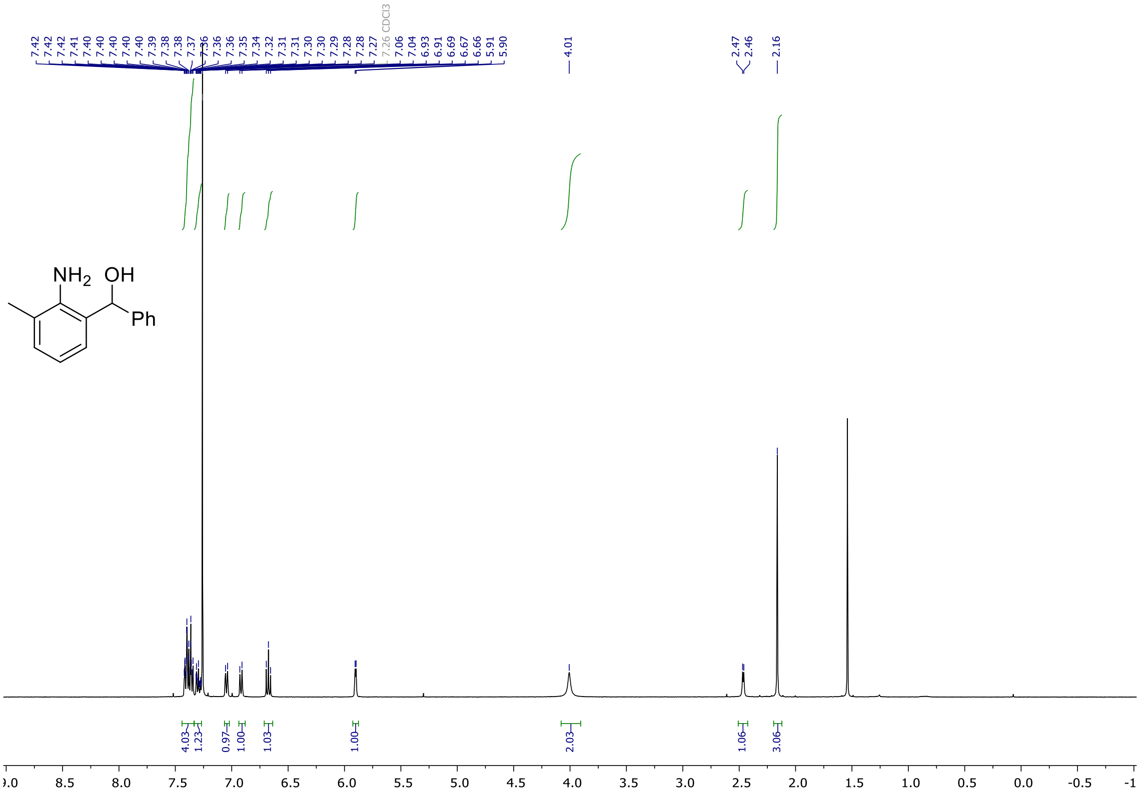


^{13}C NMR (101 MHz, $CDCl_3$)

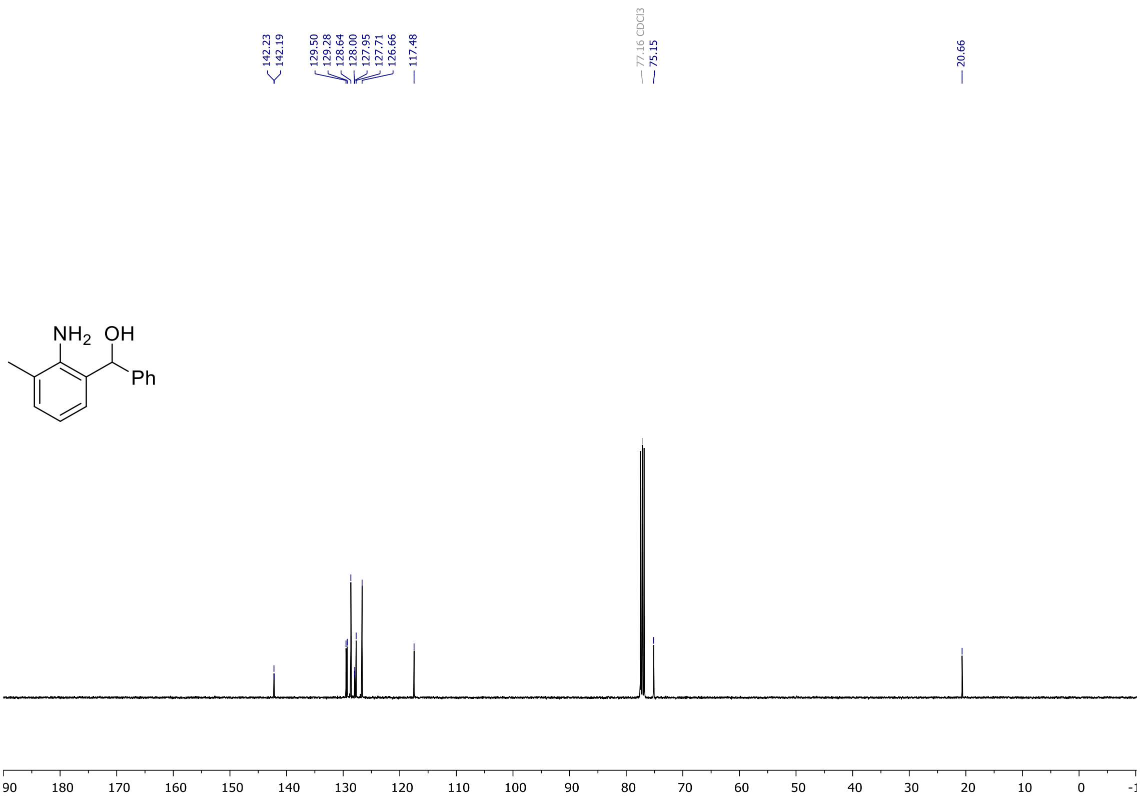


(2-amino-3-methylphenyl)(phenyl)methanol (1f”)

^{1}H NMR (400 MHz, $CDCl_3$)

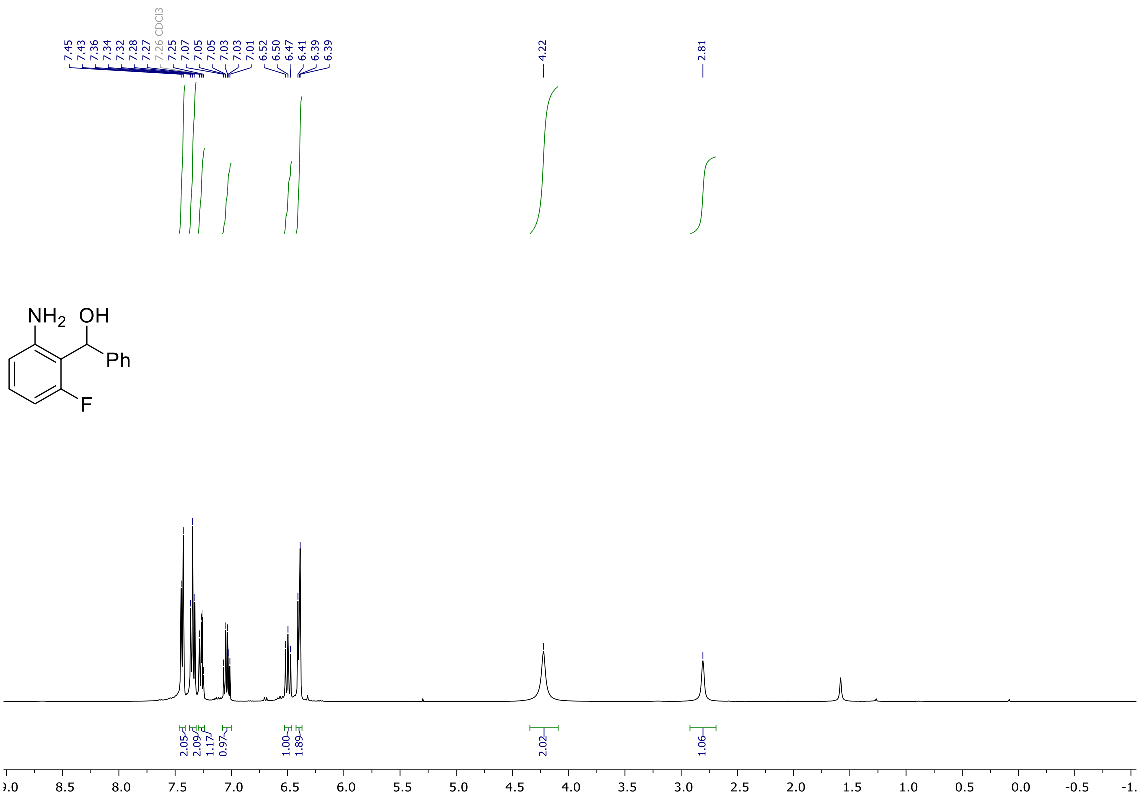


^{13}C NMR (101 MHz, $CDCl_3$)

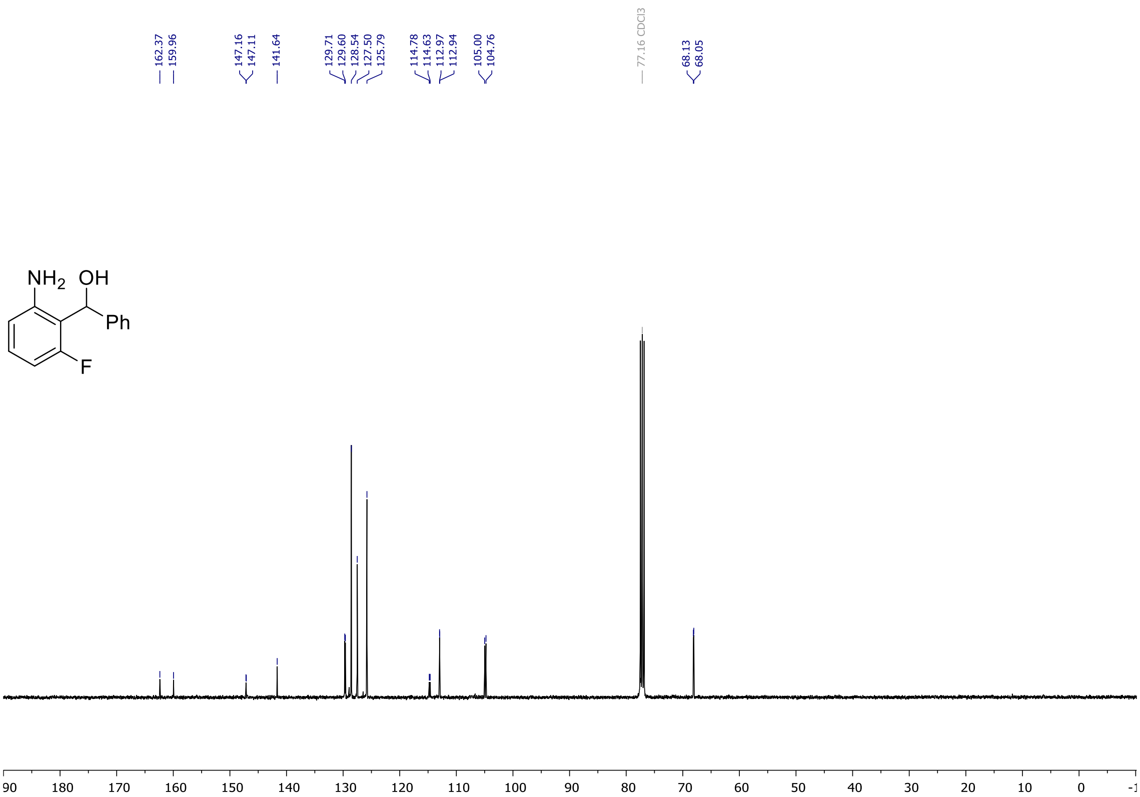


(2-amino-6-fluorophenyl)(phenyl)methanol (1g”)

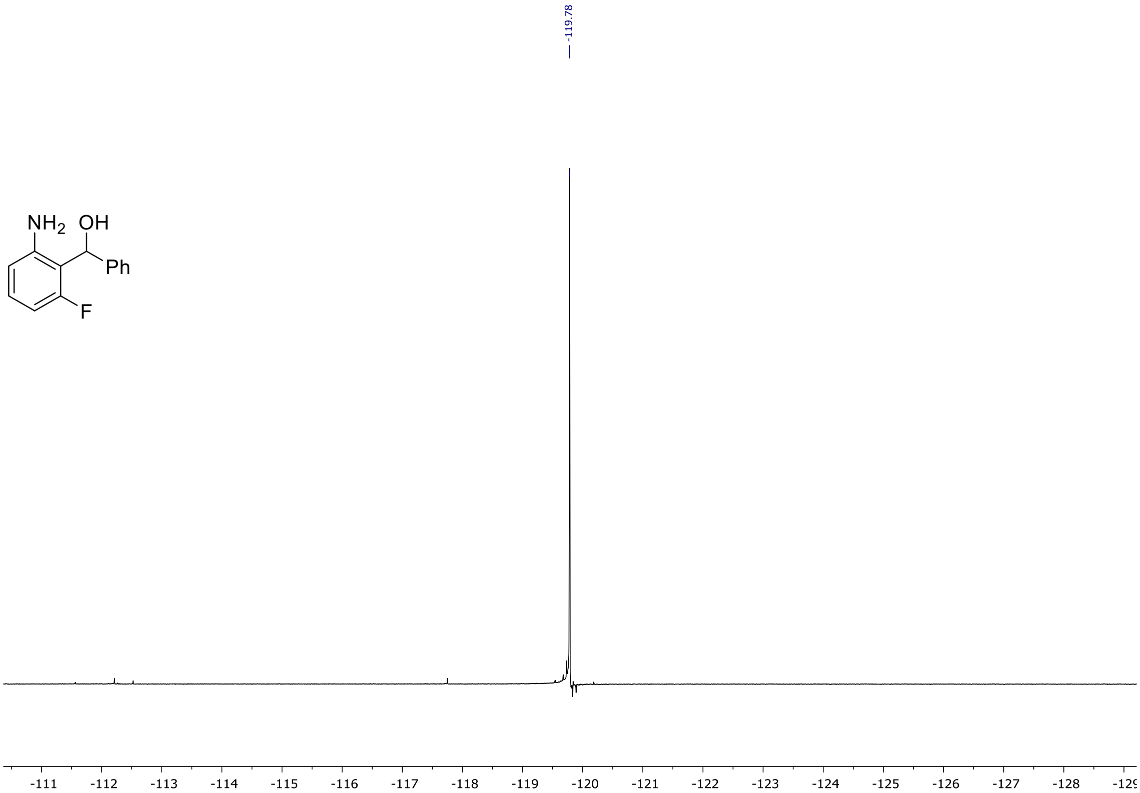
^{1}H NMR (400 MHz, CDCl$_3$)



^{13}C NMR (101 MHz, CDCl$_3$)

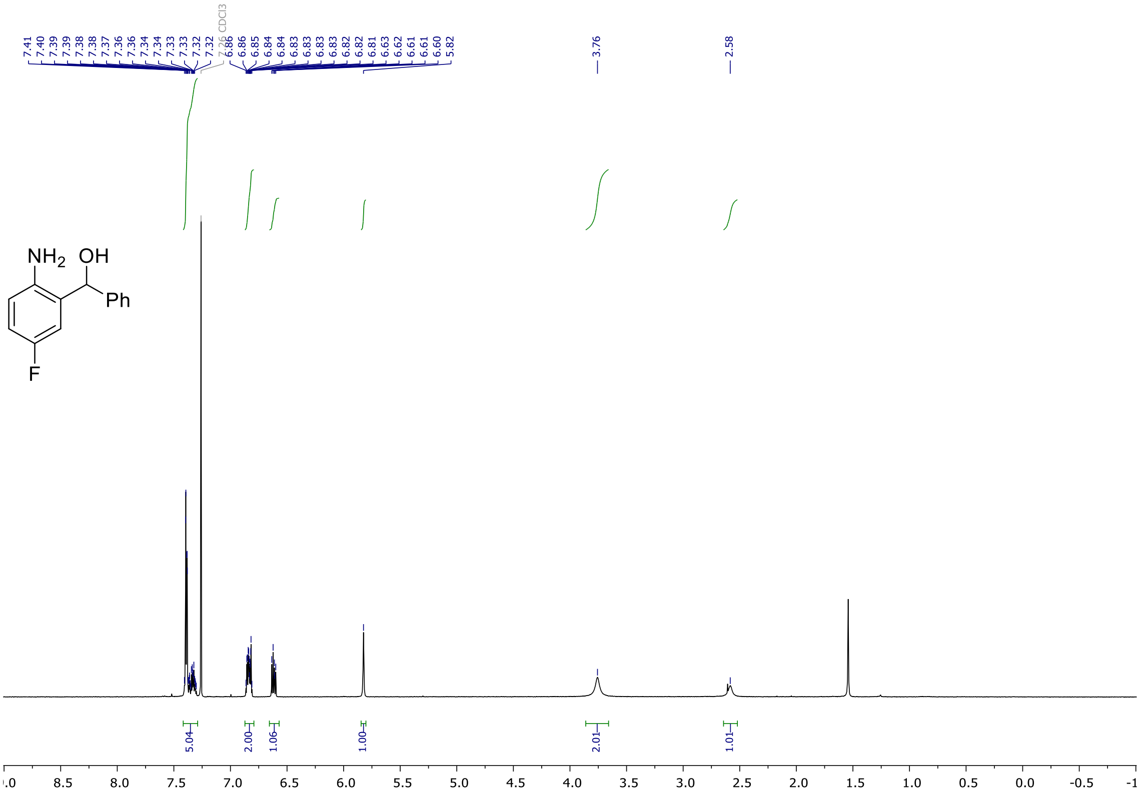


[19]F NMR (376 MHz, CDCl3)

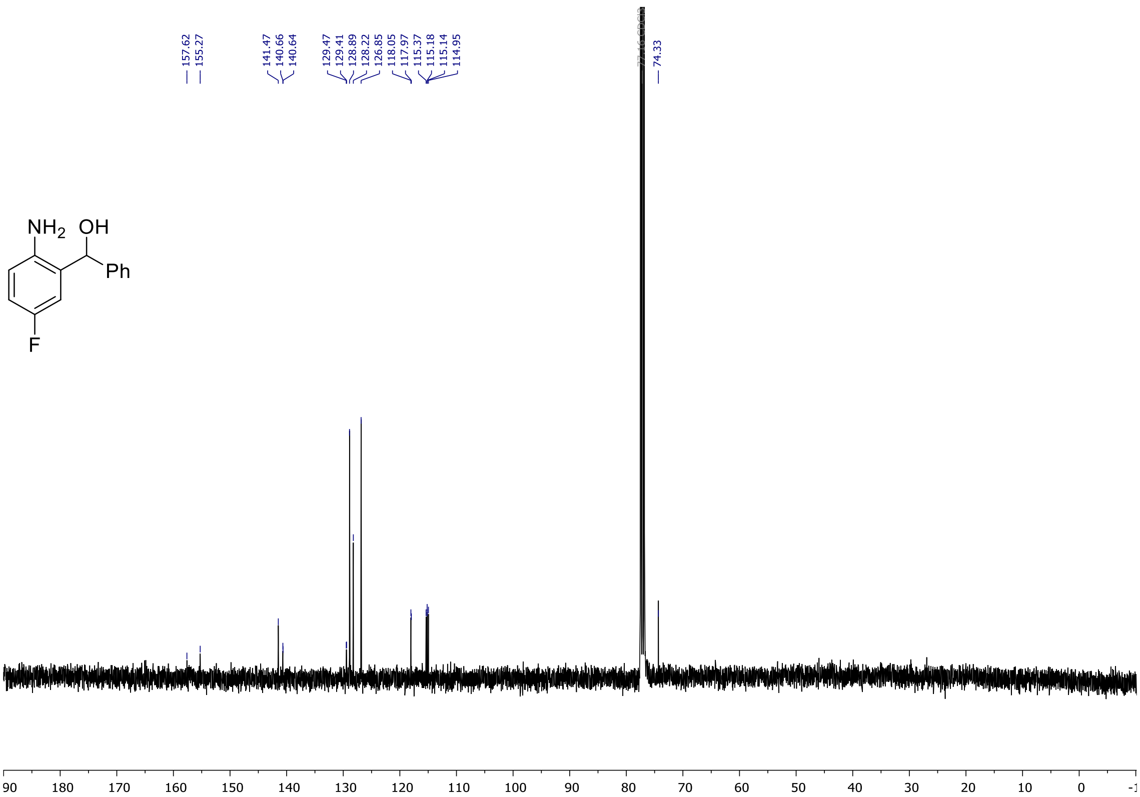


(2-amino-5-fluorophenyl)(phenyl)methanol (1h")

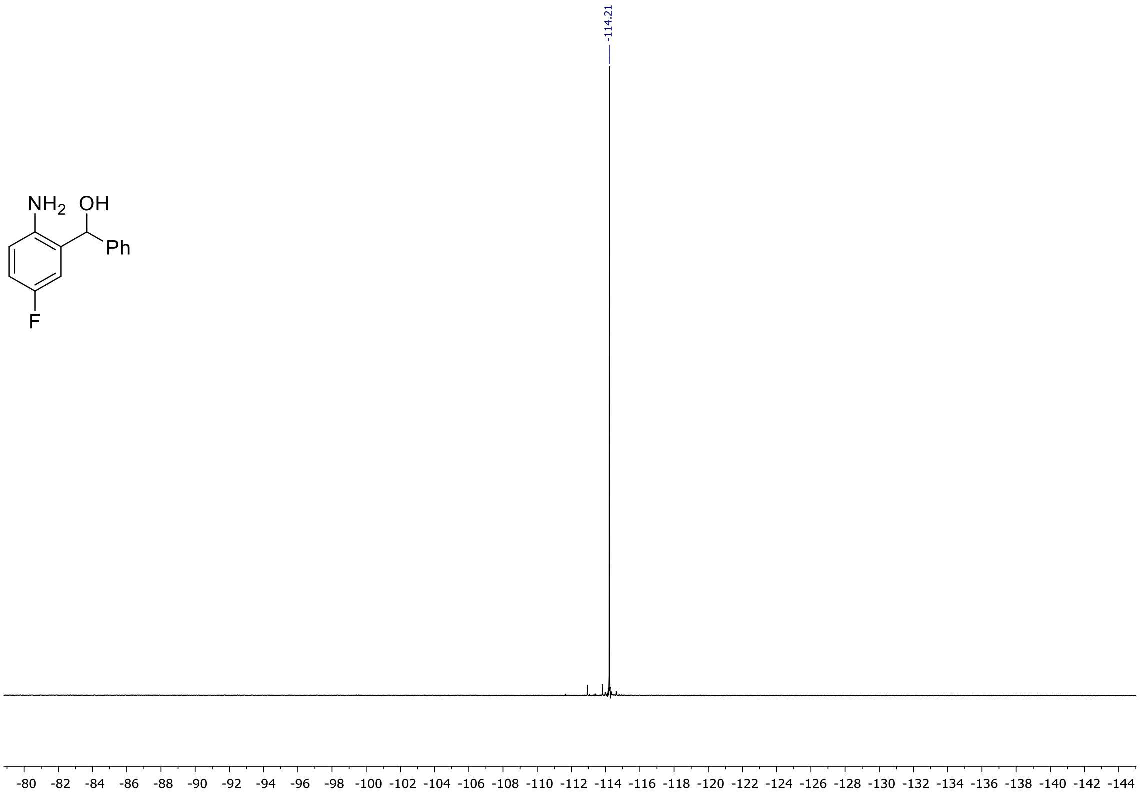
[1]H NMR (400 MHz, CDCl$_3$)



[13]C NMR (101 MHz, CDCl$_3$)

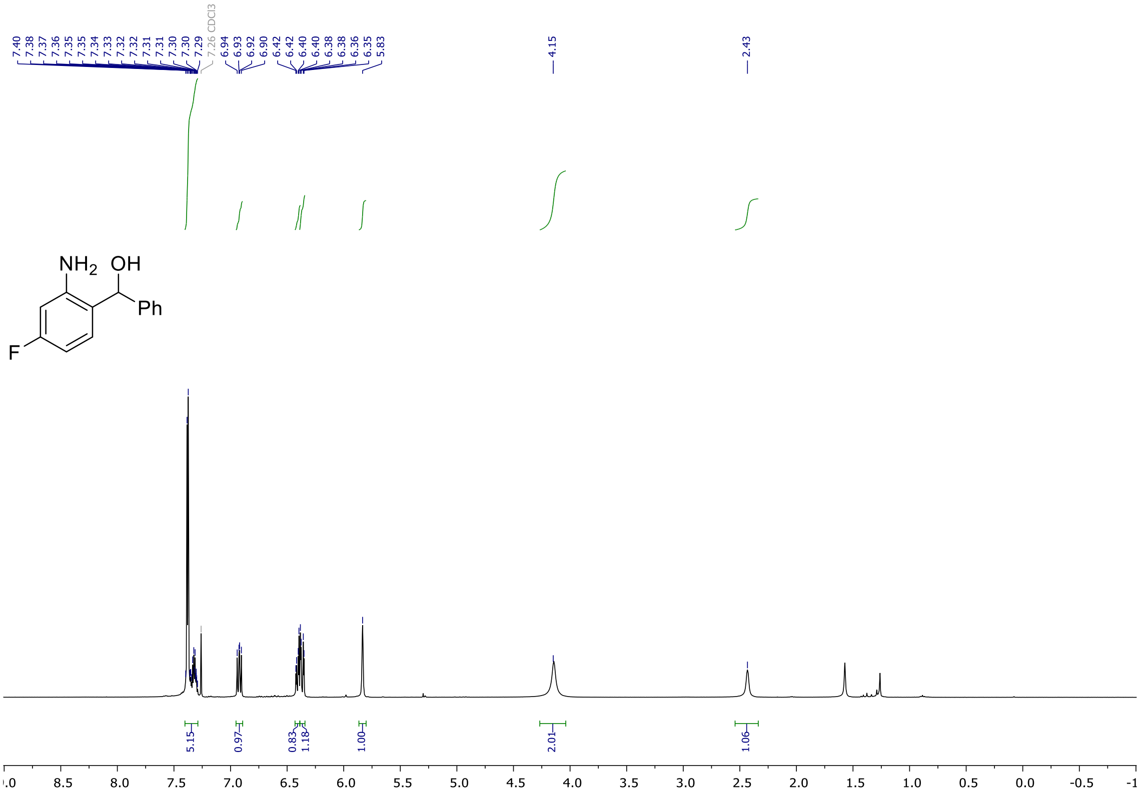


^{19}F NMR (376 MHz, $CDCl_3$)

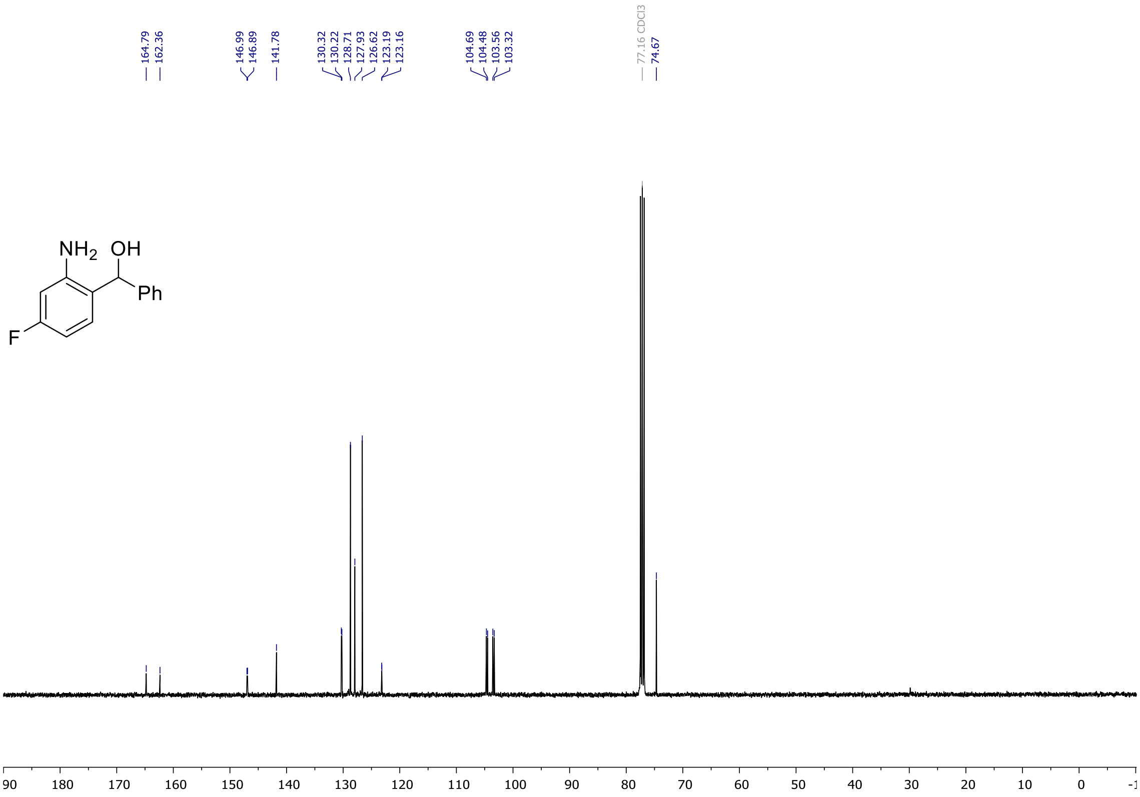


(2-amino-4-fluorophenyl)(phenyl)methanol (1i”)

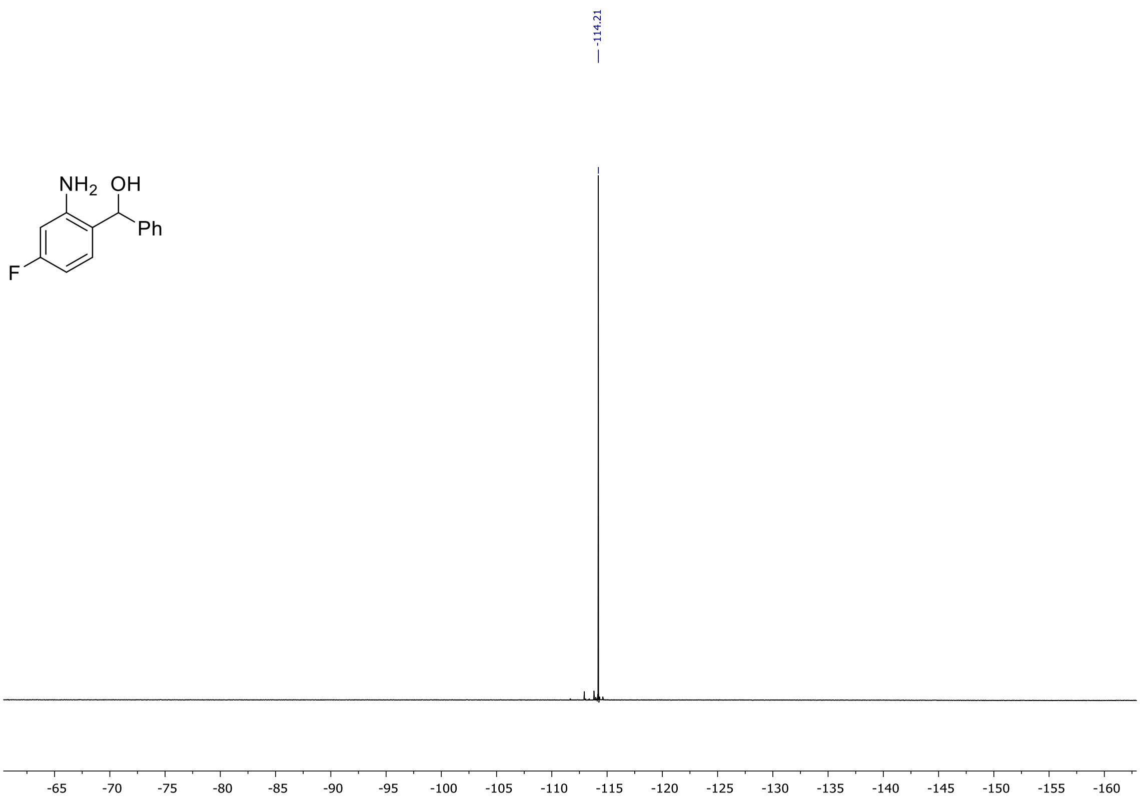
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

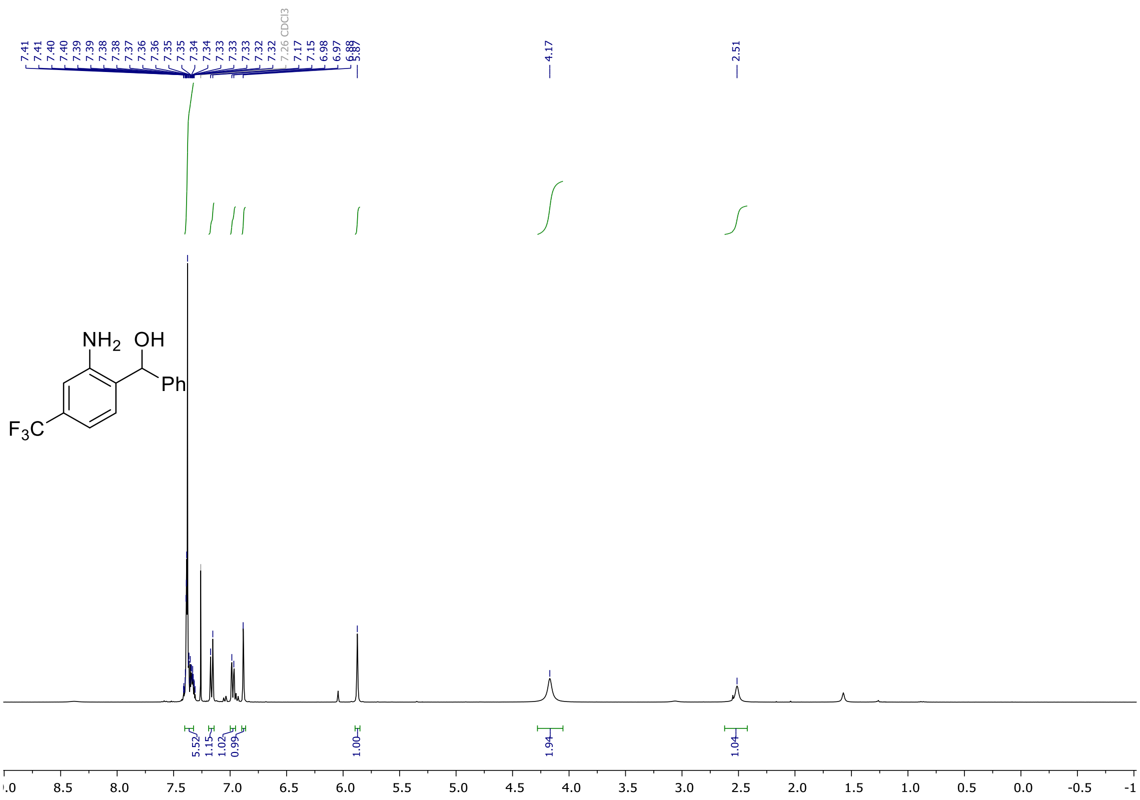


[19]F NMR (376 MHz, $CDCl_3$)

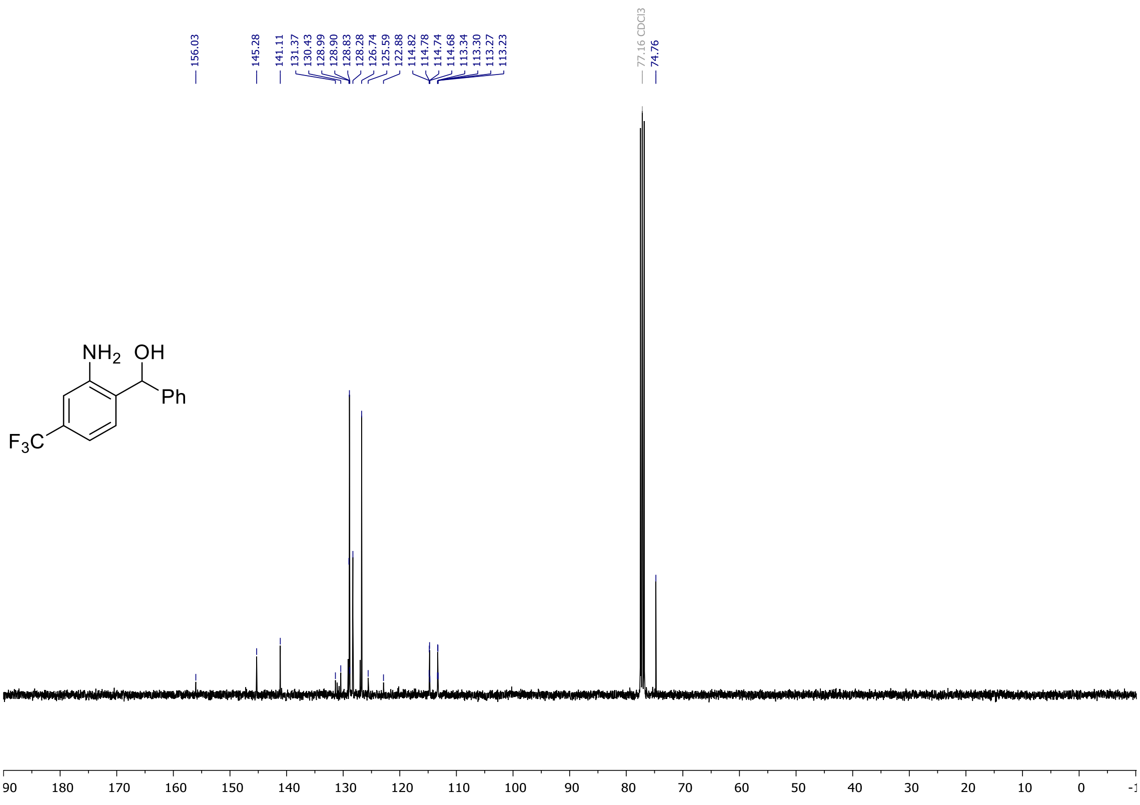


(2-amino-4-(trifluoromethyl)phenyl)(phenyl)methanol (1n”)

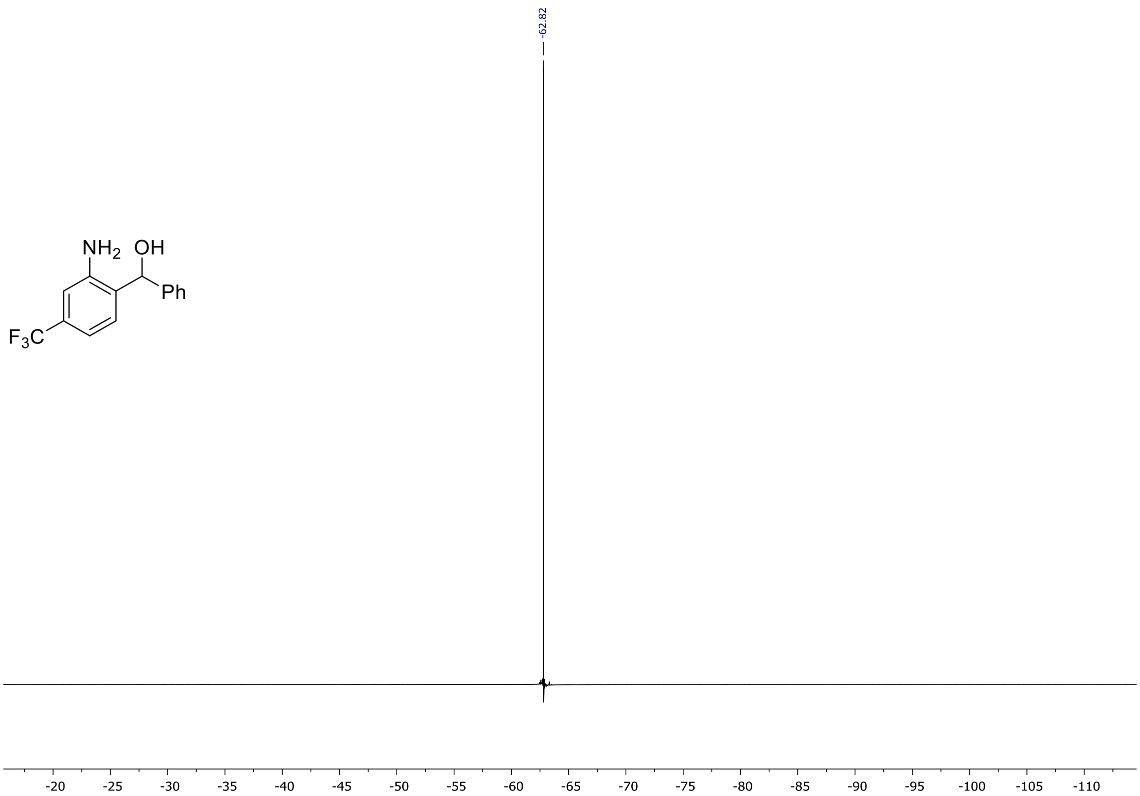
^{1}H NMR (400 MHz, CDCl$_3$)



^{13}C NMR (101 MHz, CDCl$_3$)

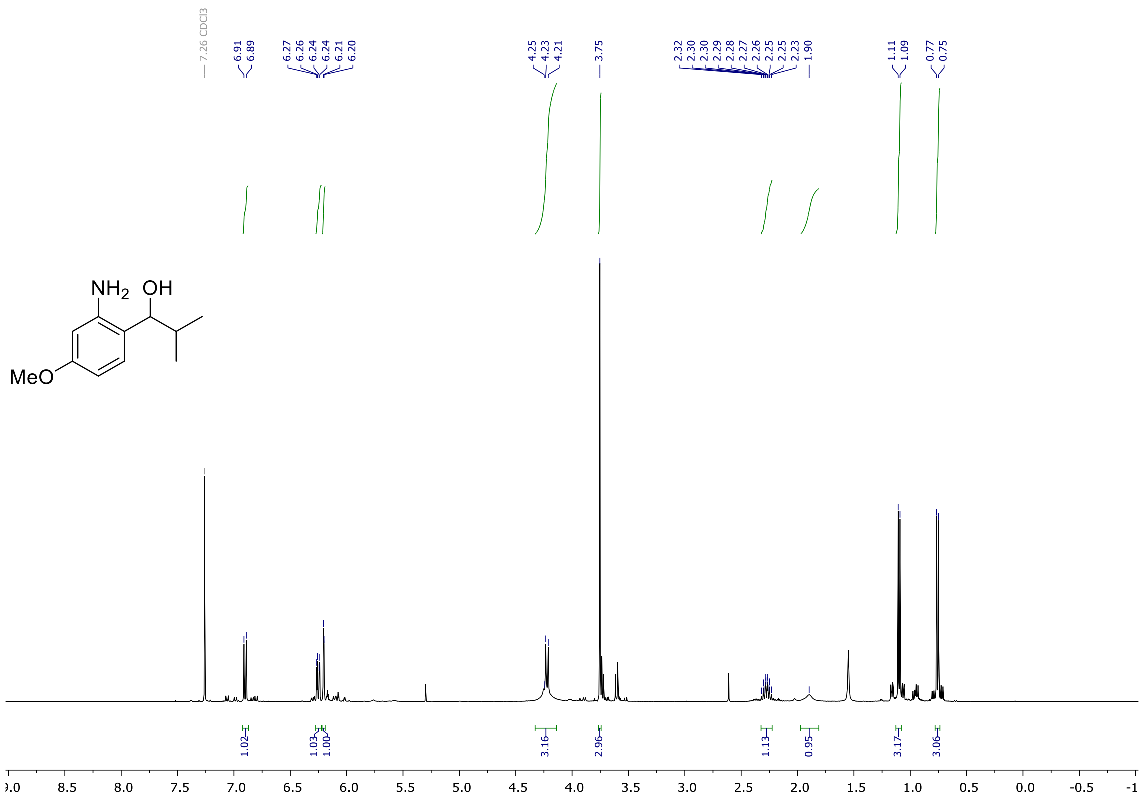


^{19}F NMR (376 MHz, $CDCl_3$)

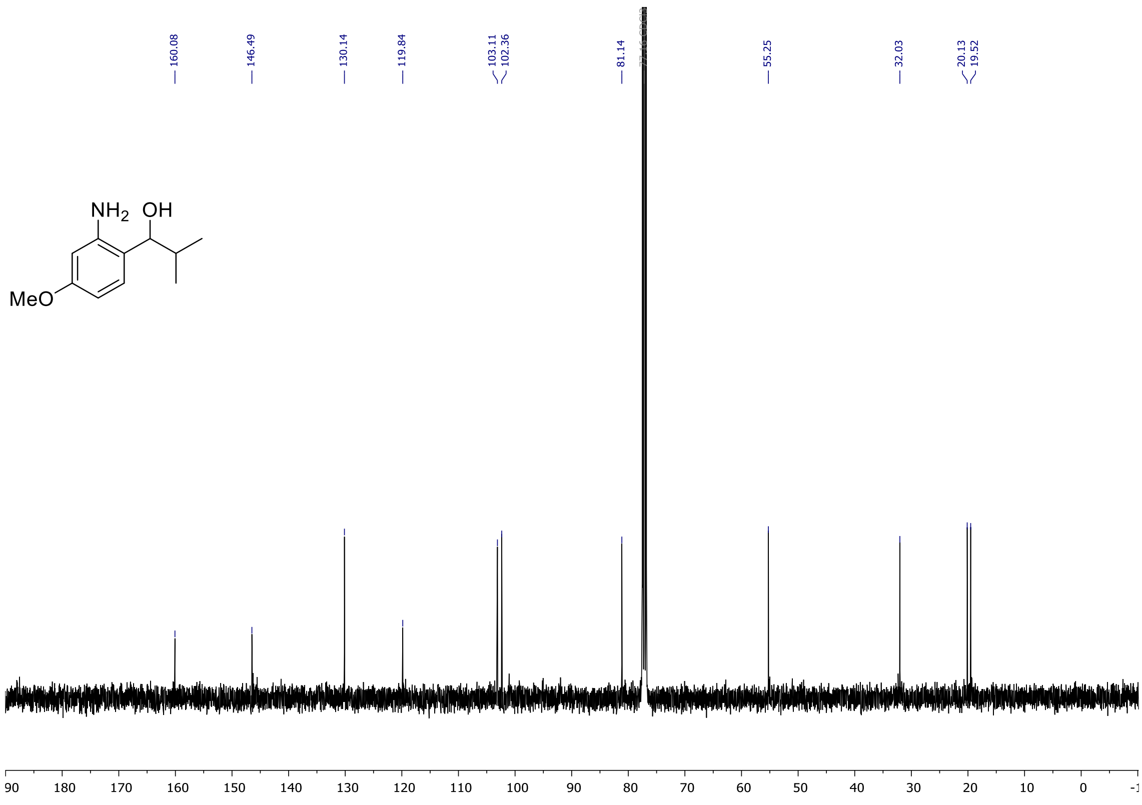


1-(2-amino-4-methoxyphenyl)-2-methylpropan-1-ol (1r'')

^{1}H NMR (400 MHz, CDCl$_3$)

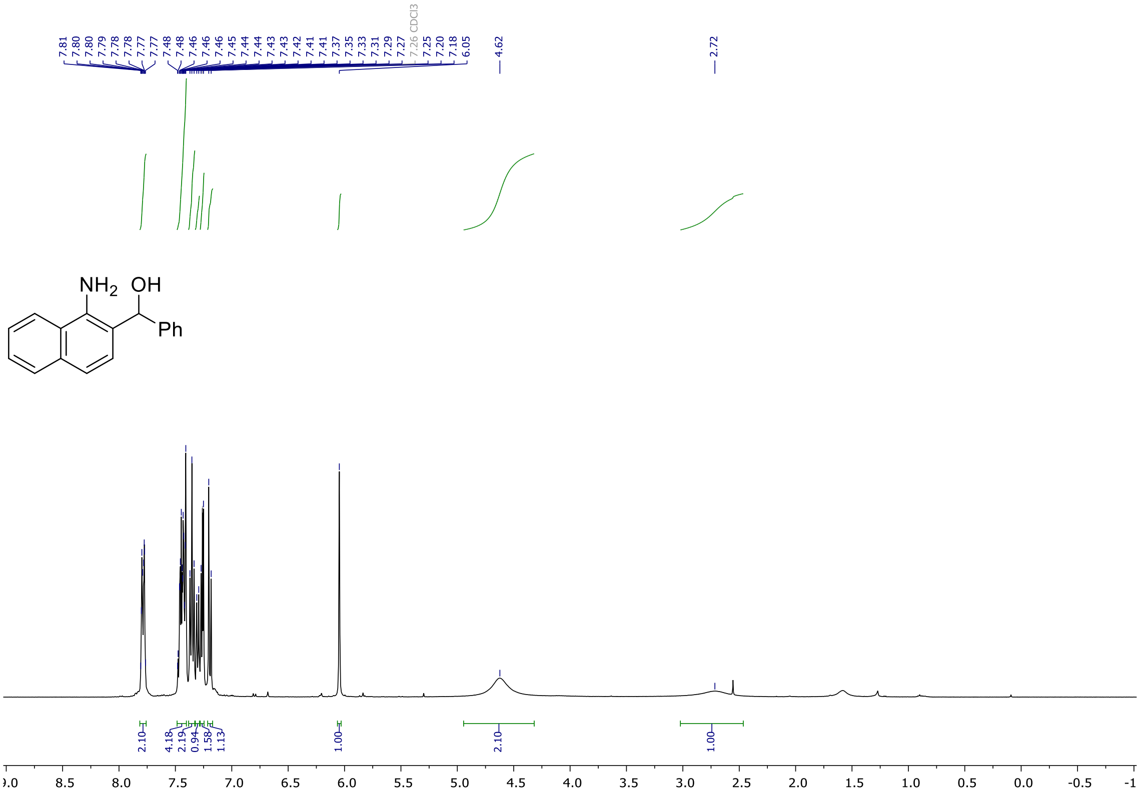


^{13}C NMR (101 MHz, CDCl$_3$)

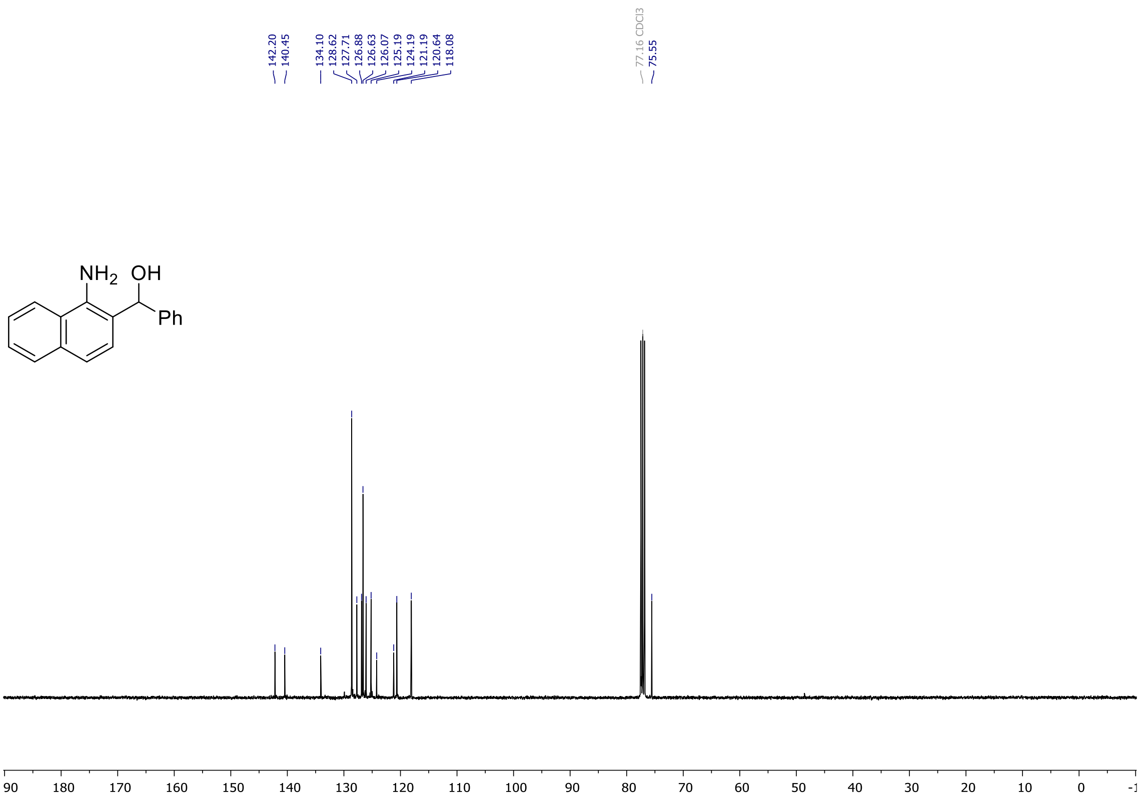


(1-aminonaphthalen-2-yl)(phenyl)methanol (1u'')

^{1}H NMR (400 MHz, CDCl$_3$)

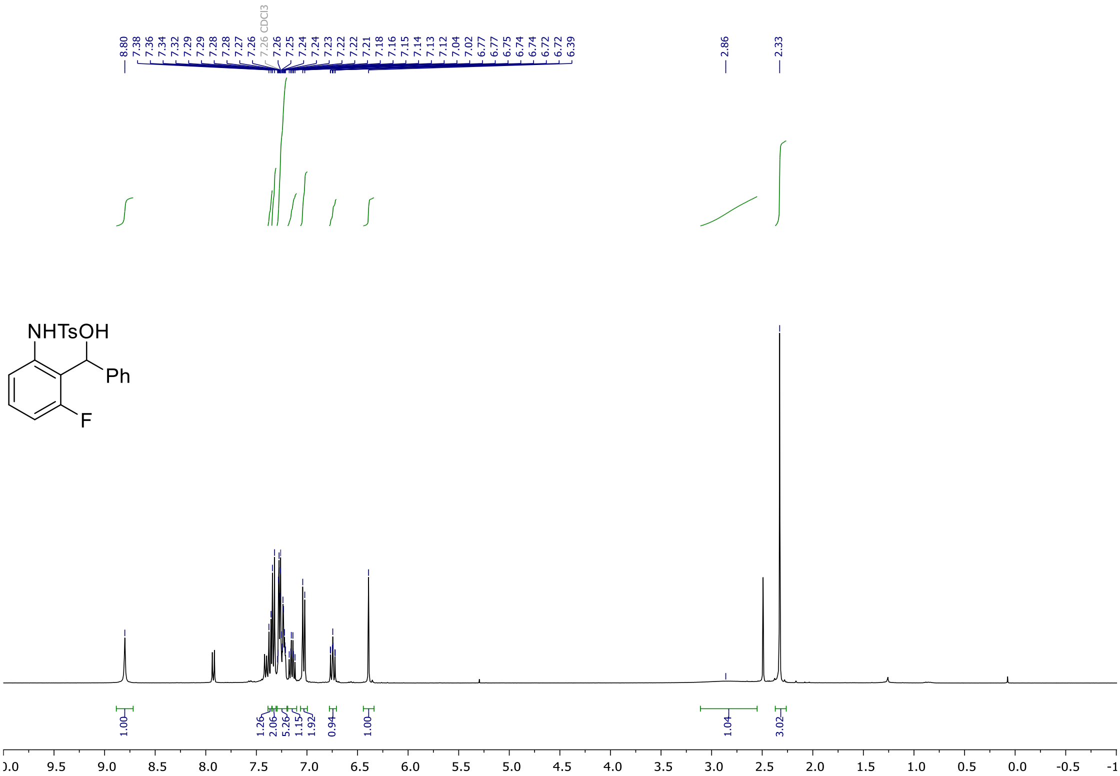


^{13}C NMR (101 MHz, CDCl$_3$)

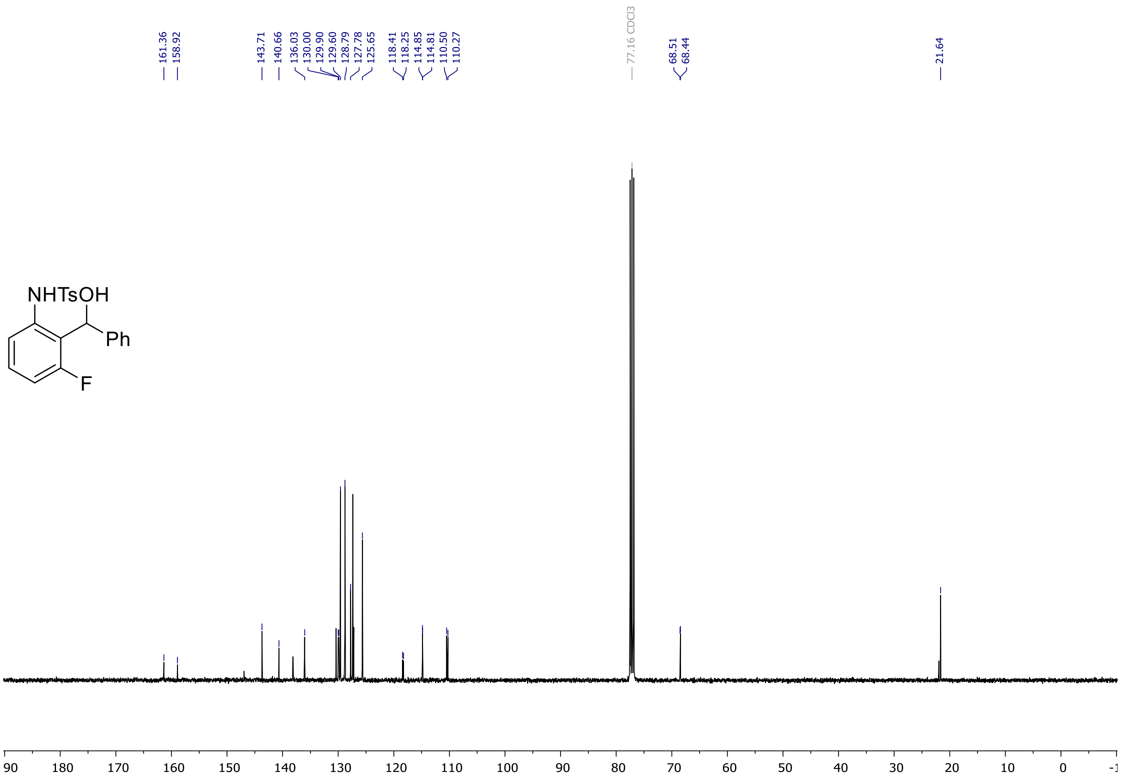


***N*-(3-fluoro-2-(hydroxy(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1g''')**

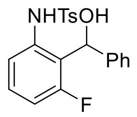
^{1}H NMR (400 MHz, $CDCl_3$)

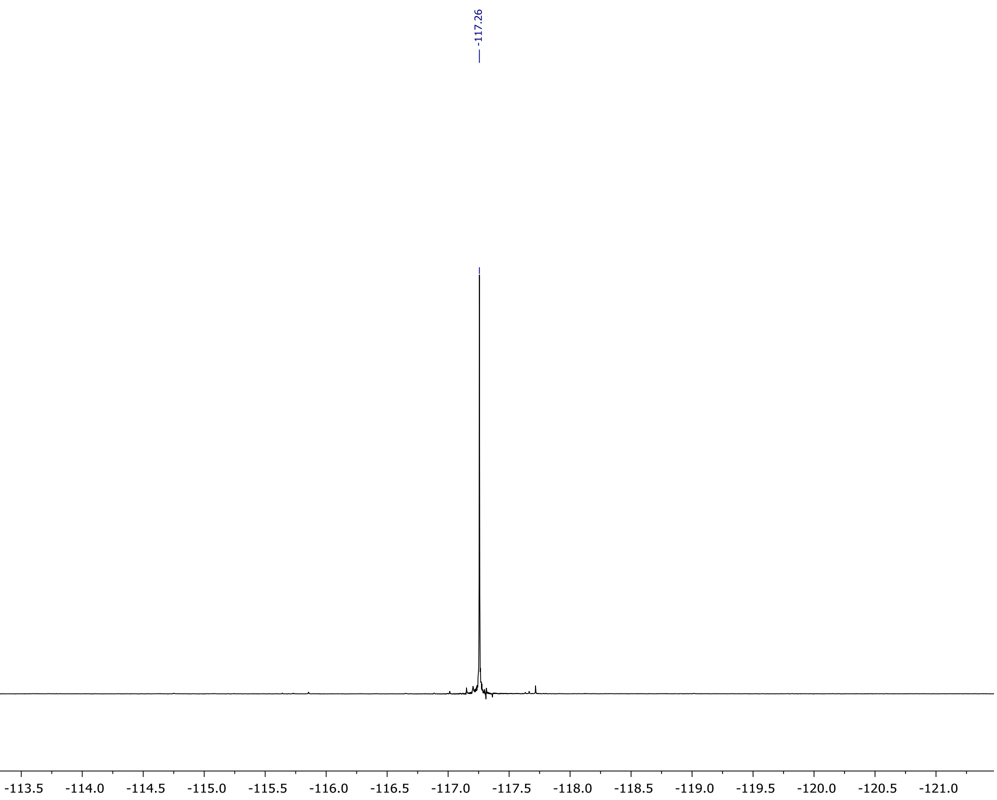


^{13}C NMR (101 MHz, $CDCl_3$)



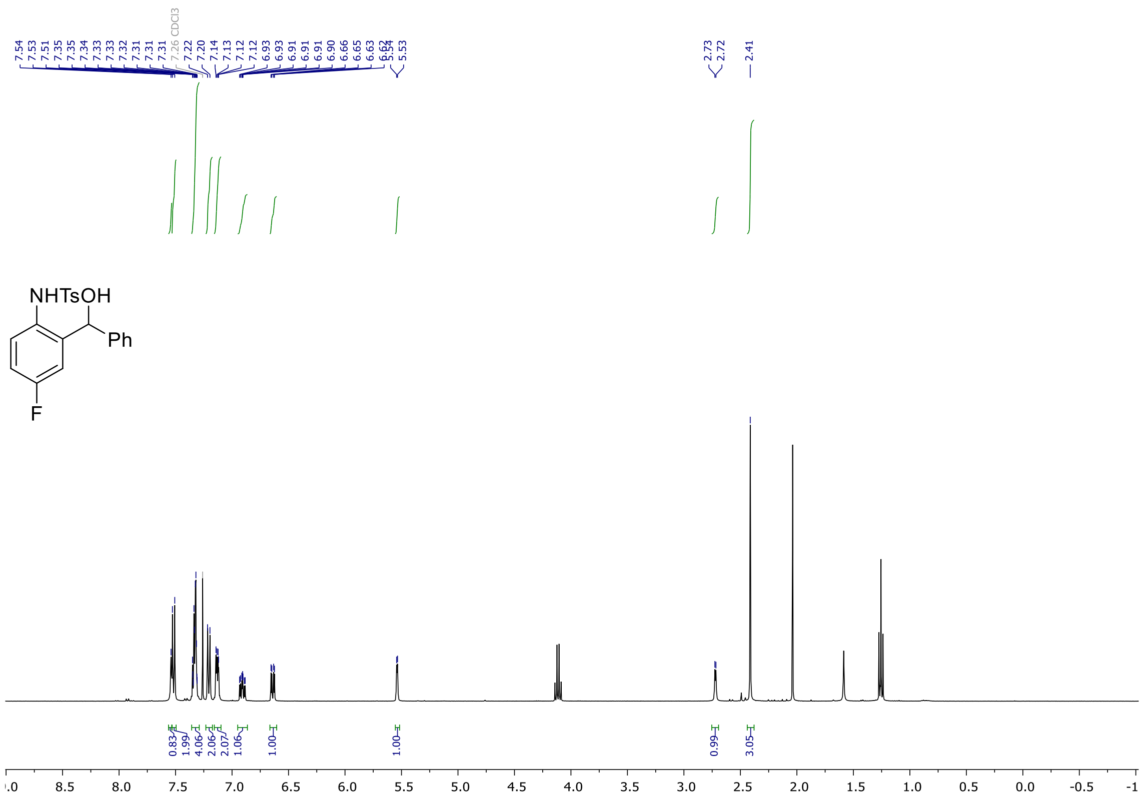
^{19}F NMR (376 MHz, $CDCl_3$)



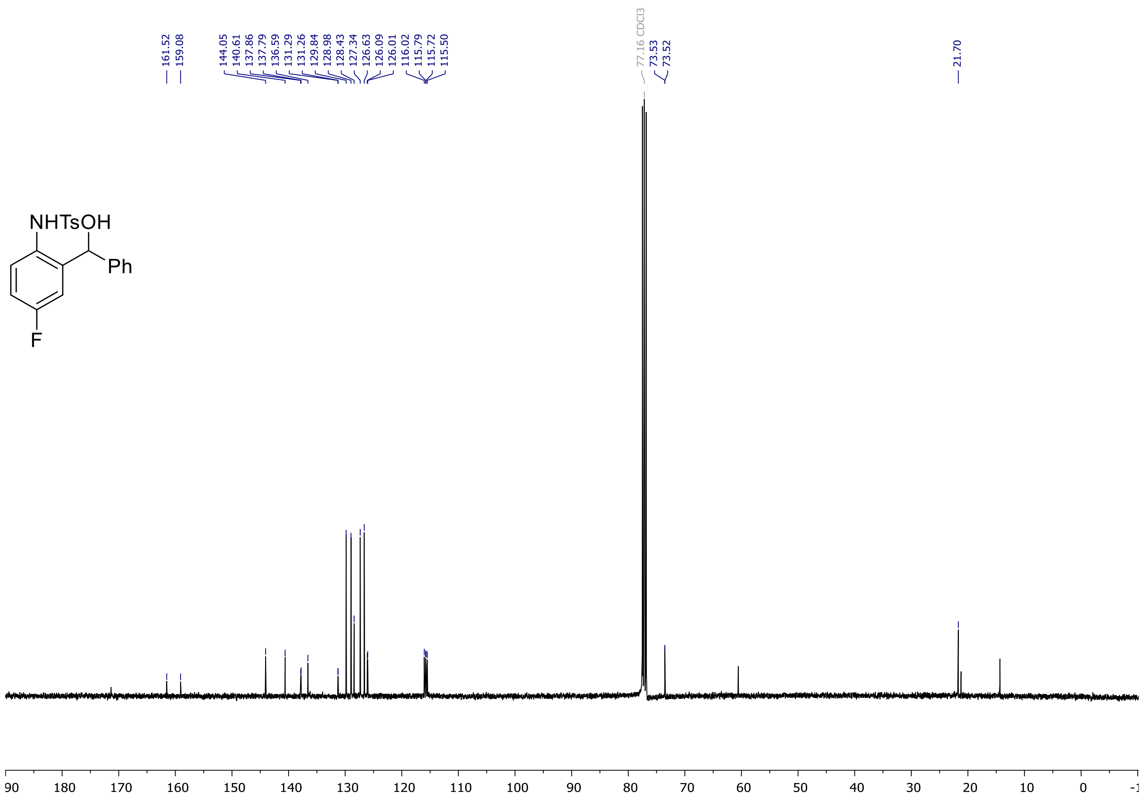


***N*-(4-fluoro-2-(hydroxy(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide(1h''')**

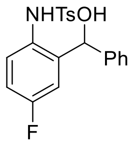
[1]H NMR (400 MHz, $CDCl_3$)

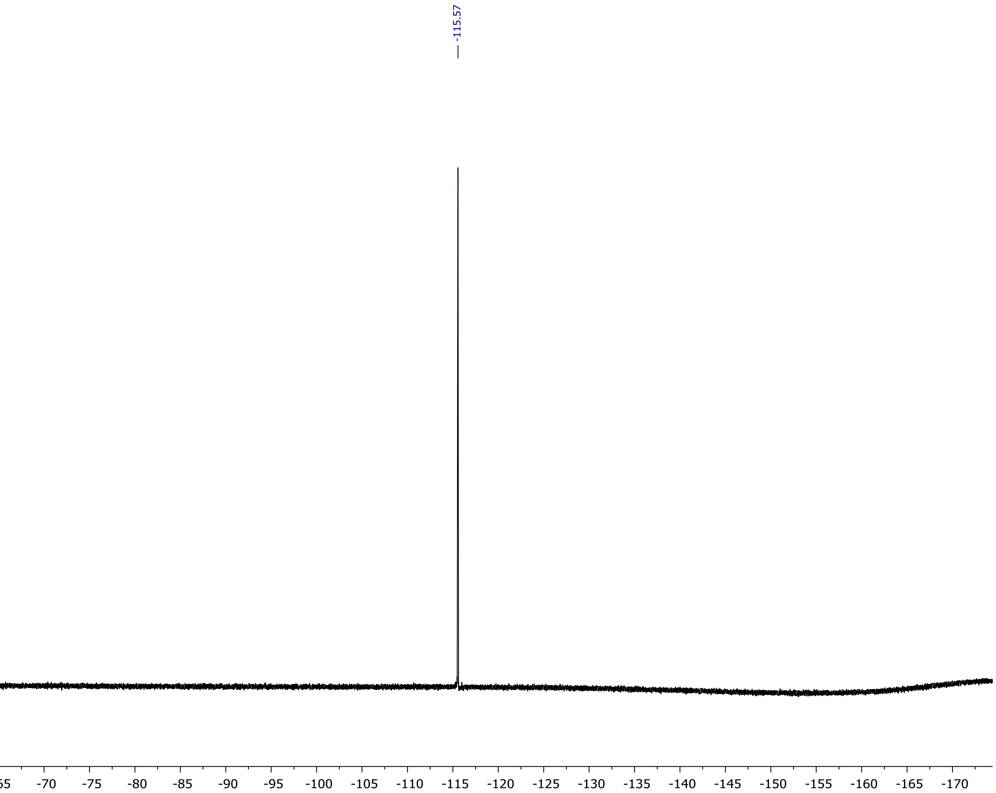


[13]C NMR (101 MHz, $CDCl_3$)



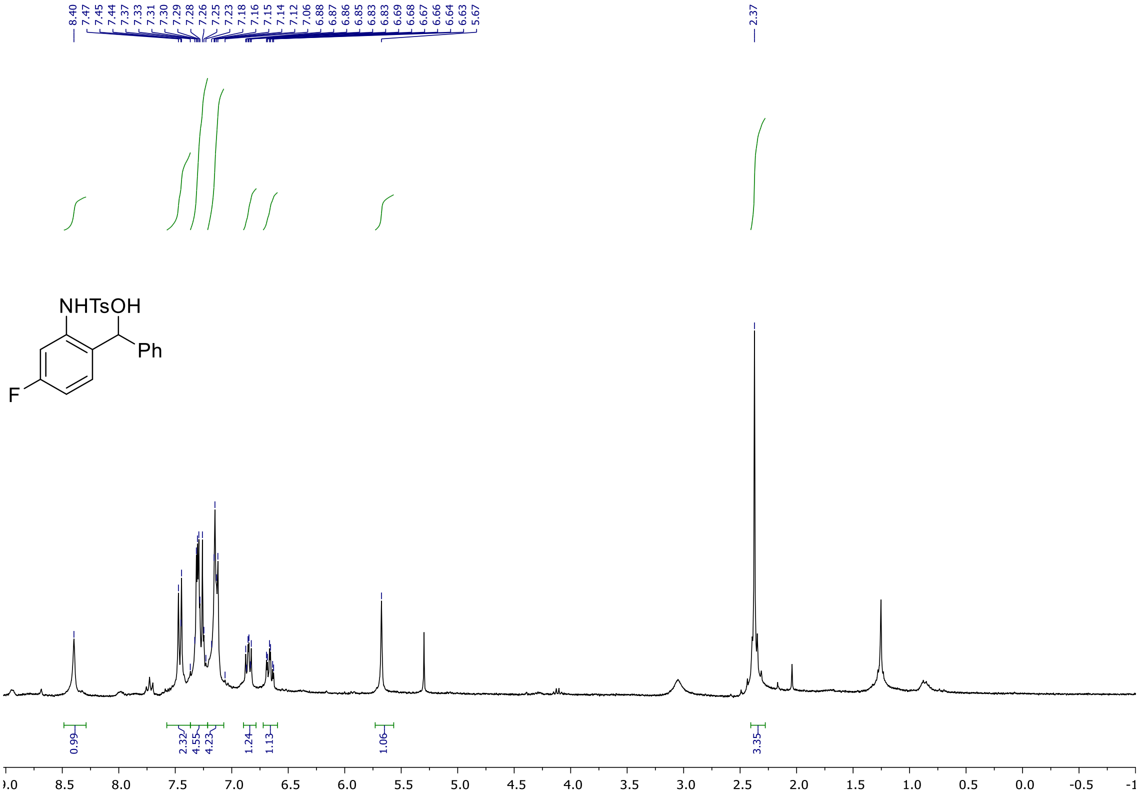
[19]F NMR (376 MHz, CDCl$_3$)



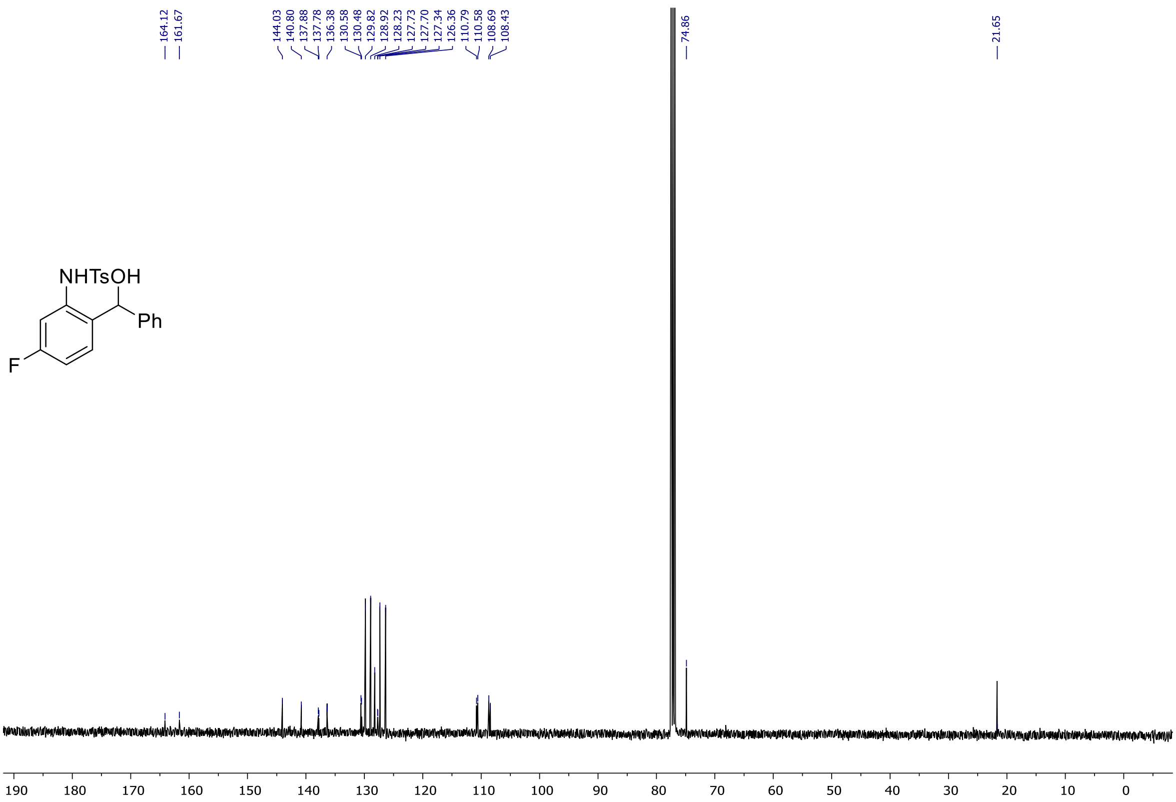


N-(5-fluoro-2-(hydroxy(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1i''')

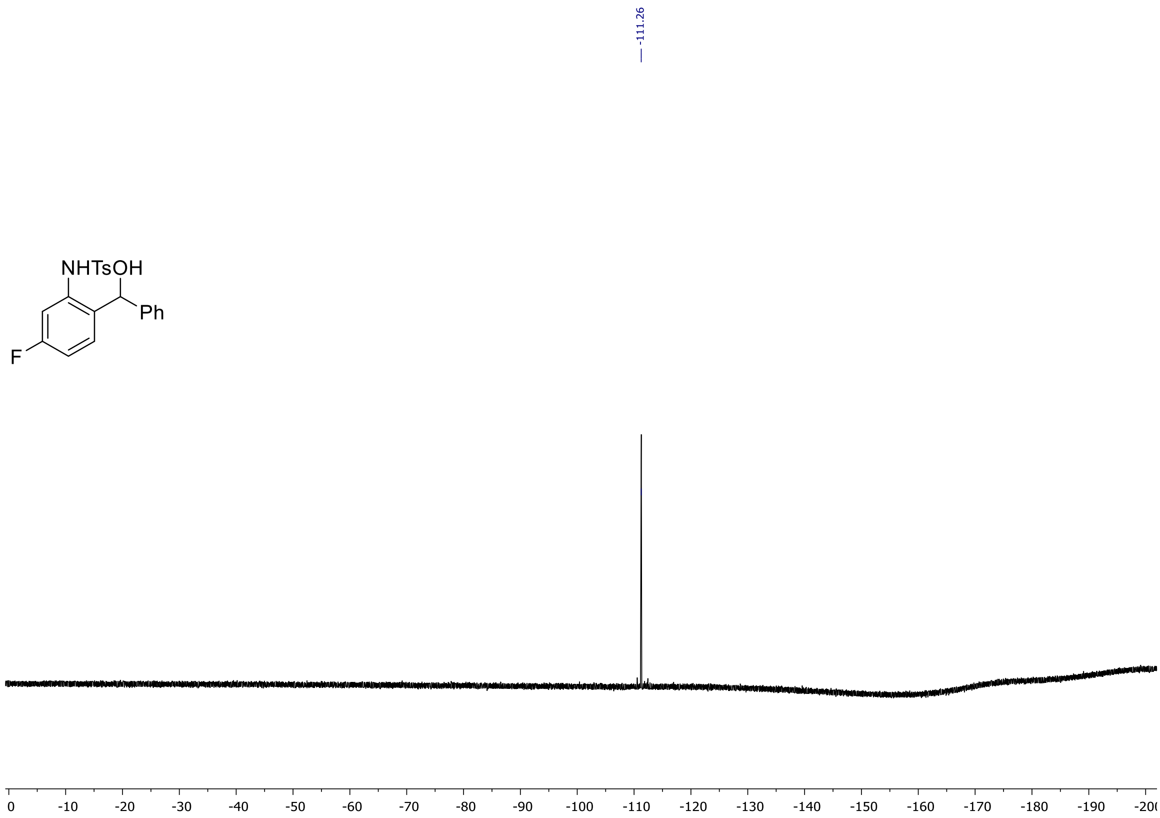
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

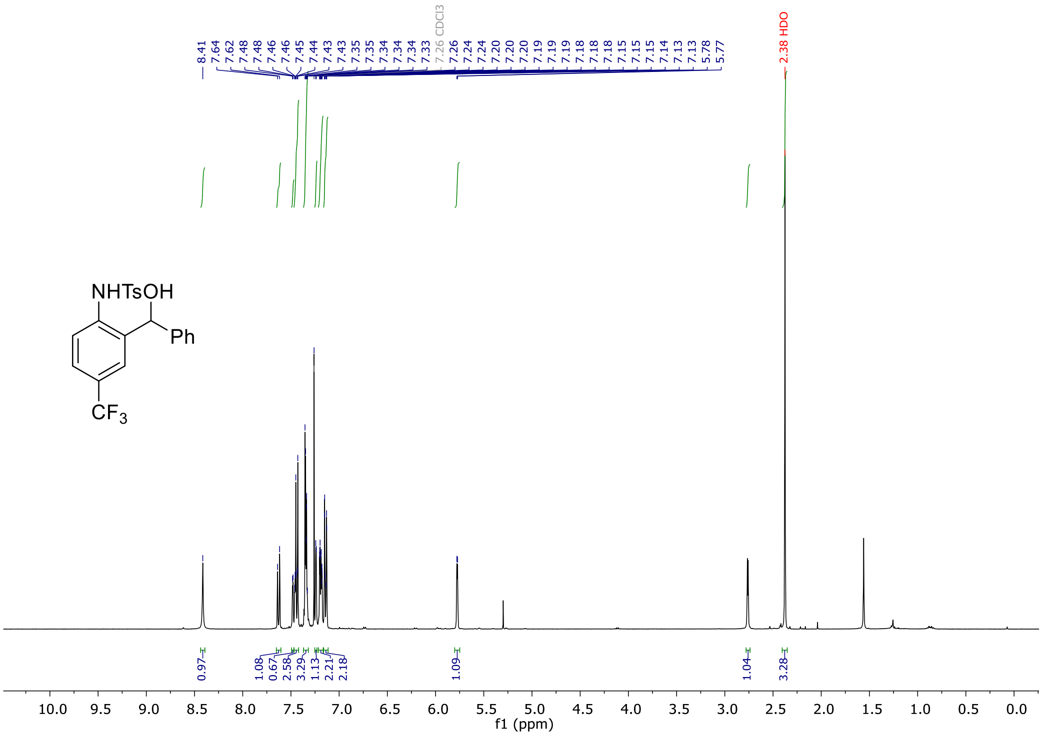


^{19}F NMR (376 MHz, $CDCl_3$)

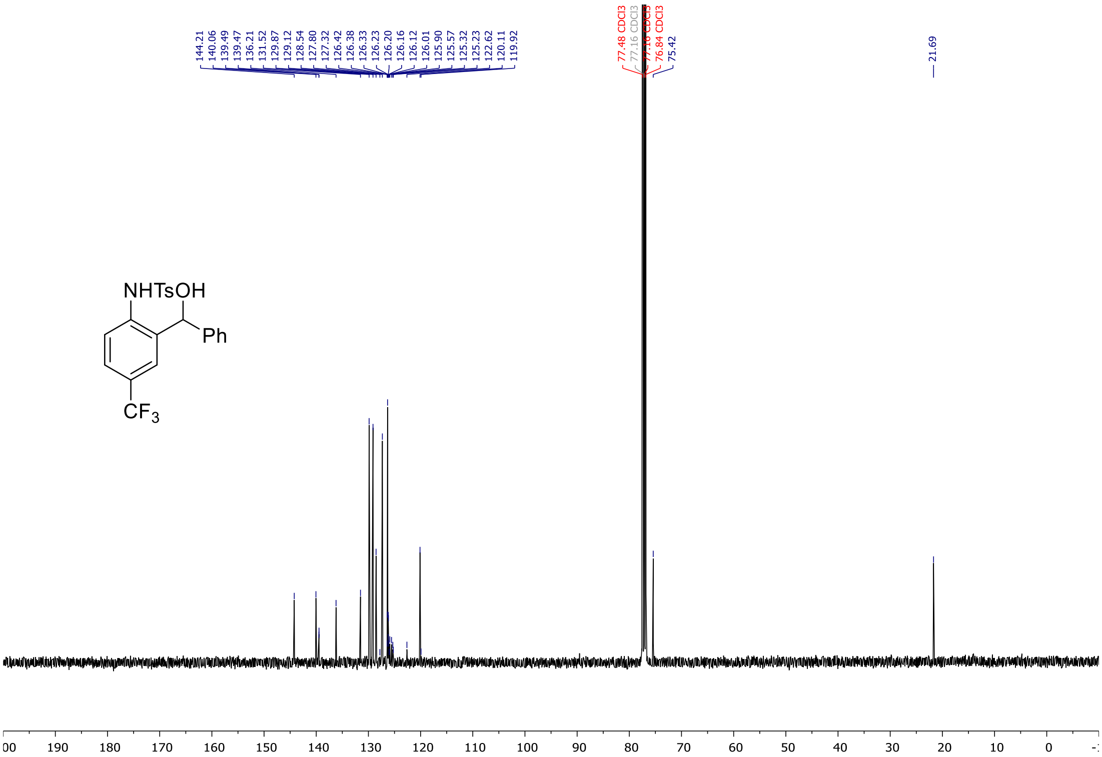


***N-(*2-(hydroxy(phenyl)methyl)-4-(trifluoromethyl)phenyl)-4-methylbenzenesulfonamide (1m''')**

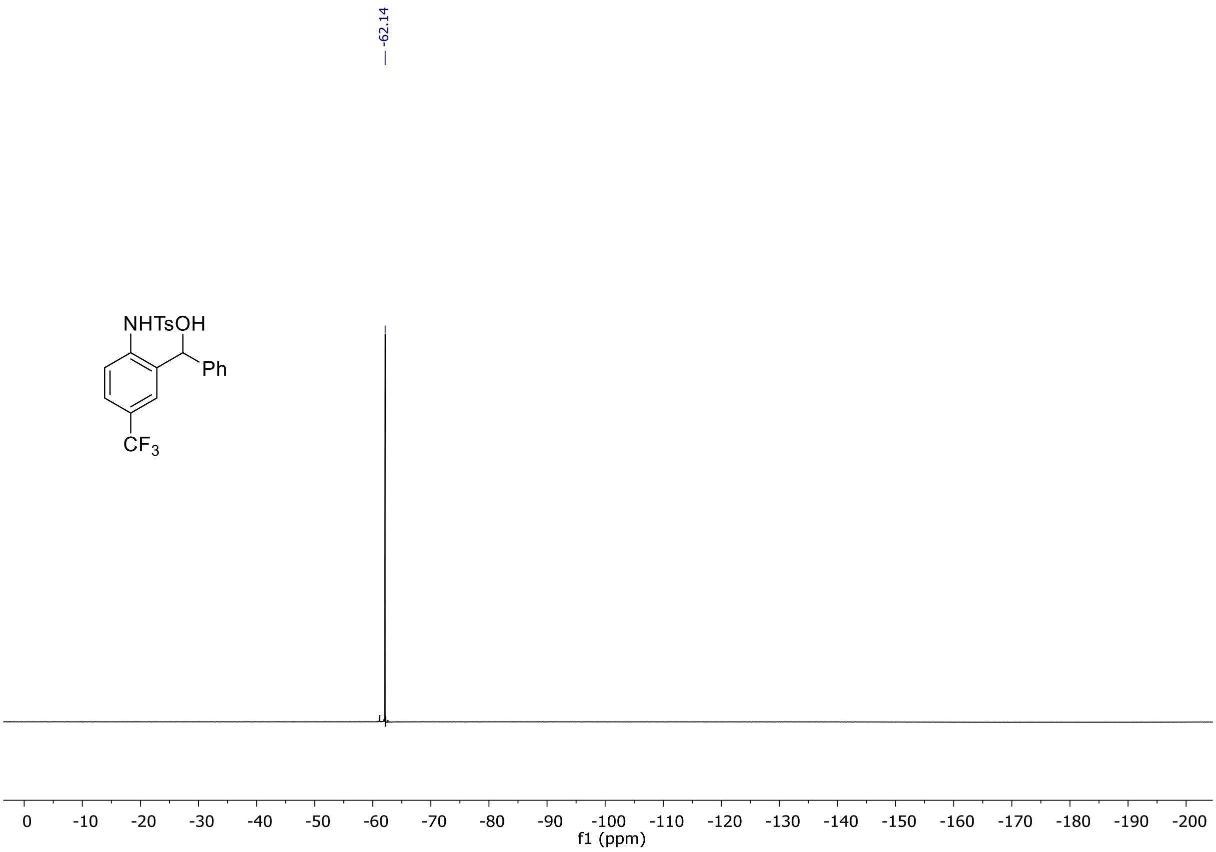
[1]H RMN (400 MHz, CDCl$_3$)



[13]C RMN (101 MHz, CDCl$_3$)

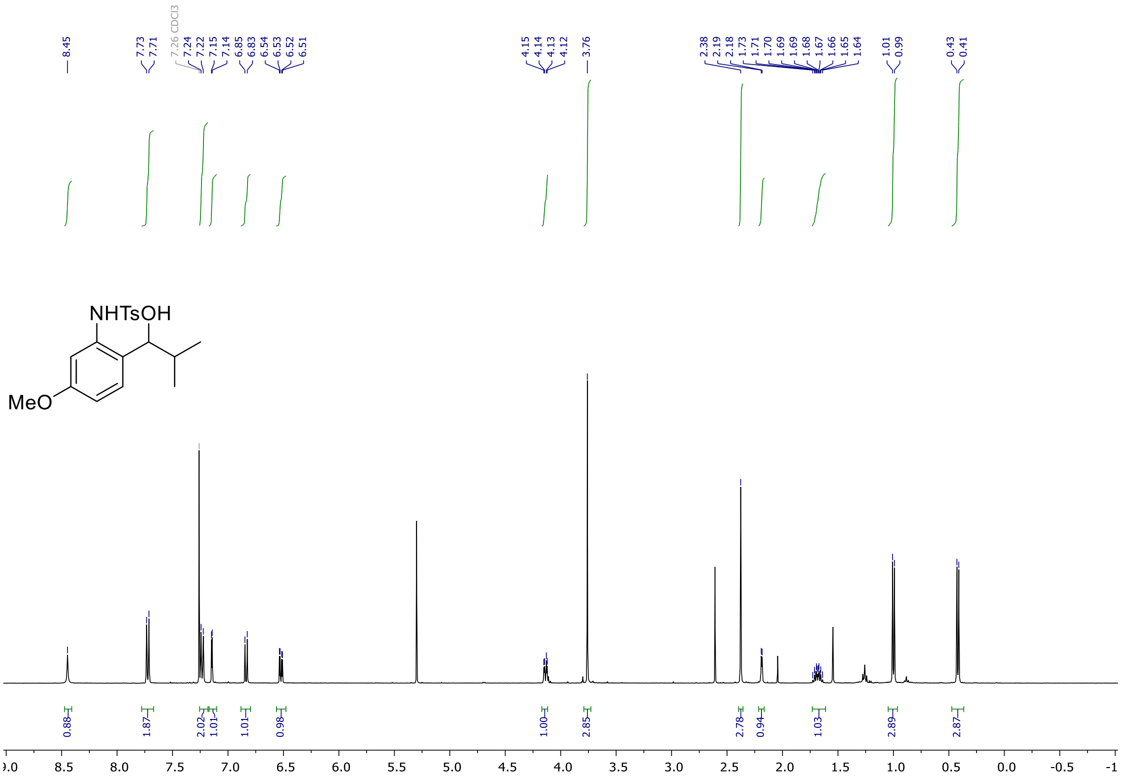


^{19}F NMR (376 MHz, $CDCl_3$)

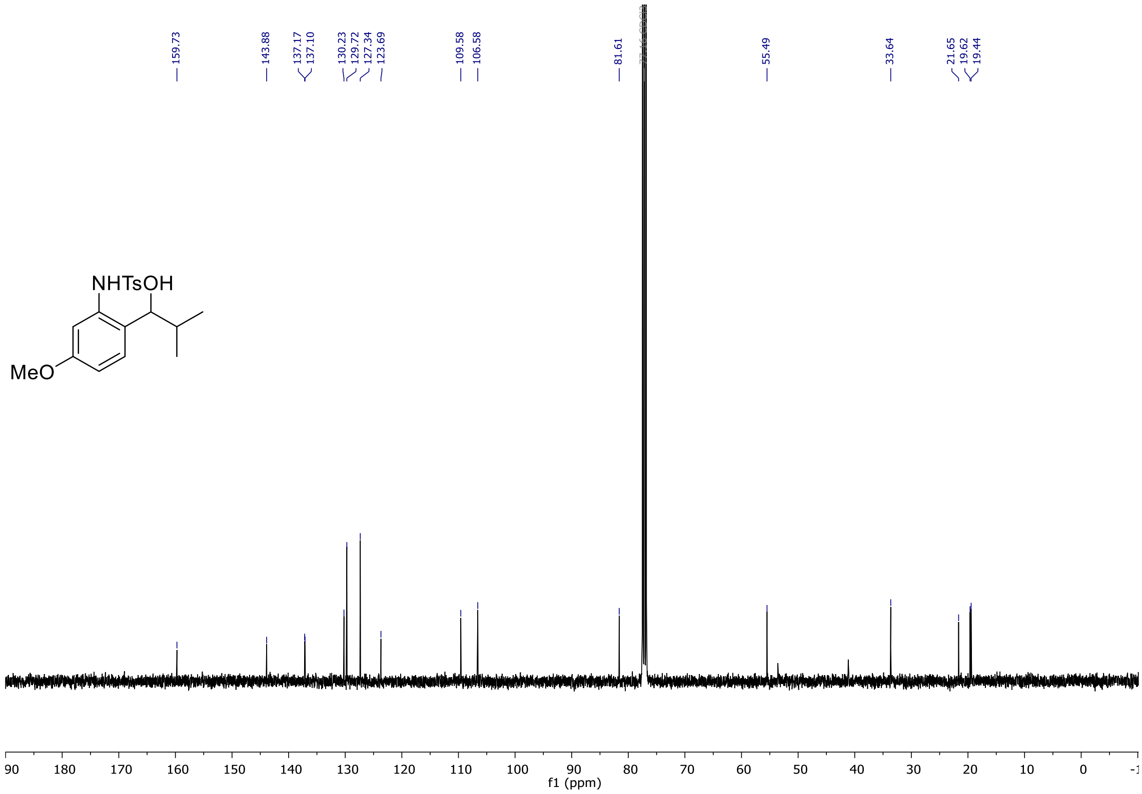


***N*-(2-(1-hydroxy-2-methylpropyl)-5-methoxyphenyl)-4-methylbenzenesulfonamide (1r''')**

^{1}H NMR (400 MHz, $CDCl_3$)

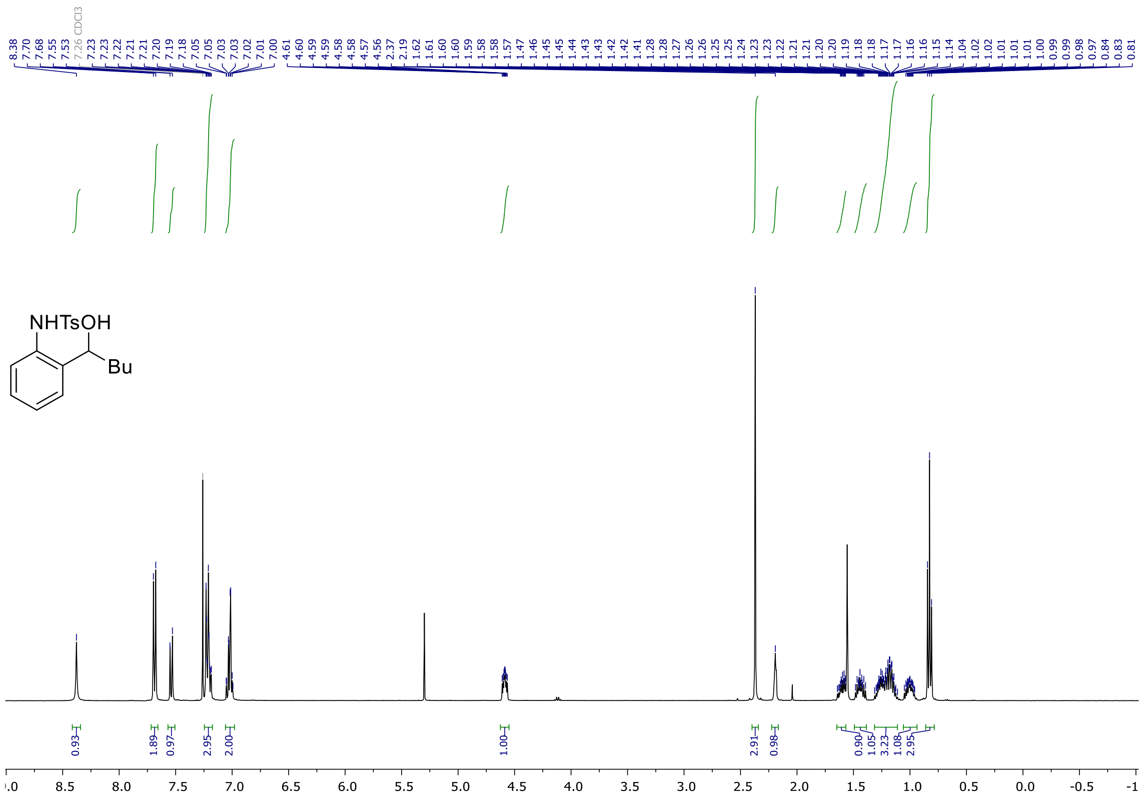


^{13}C NMR (101 MHz, $CDCl_3$)

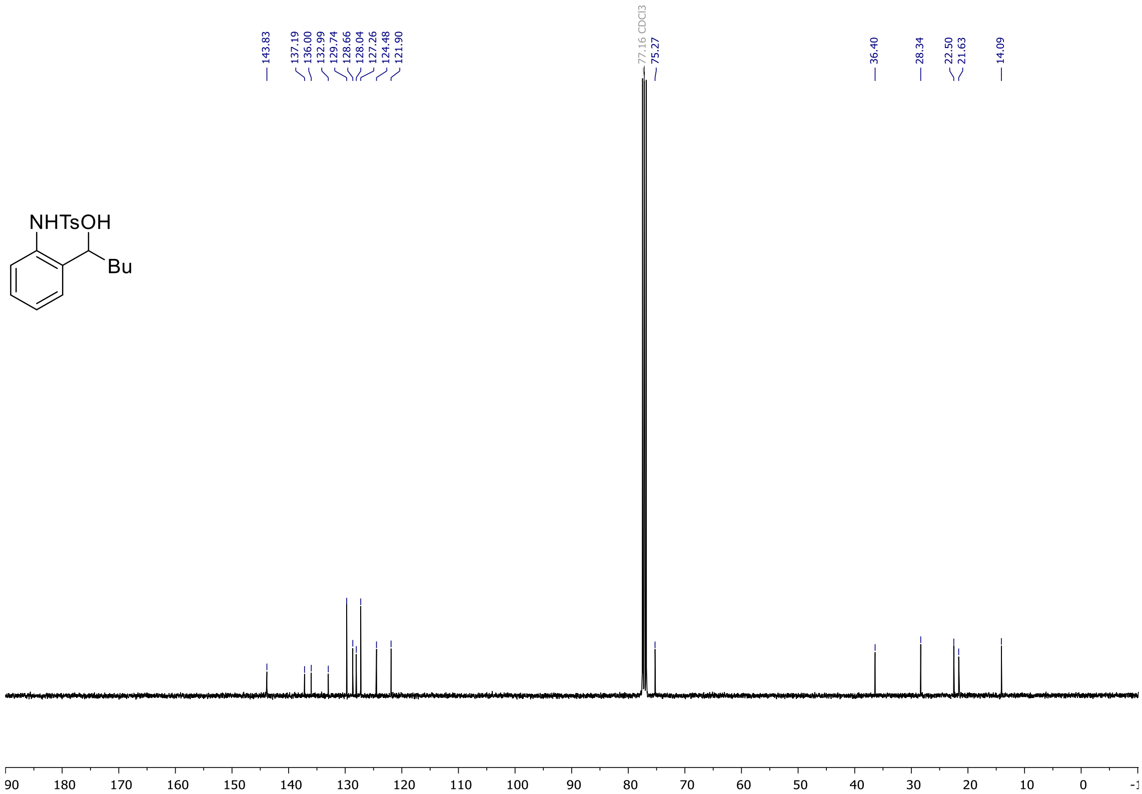


N-(2-(1-hydroxypentyl)phenyl)-4-methylbenzenesulfonamide (1s''')

^{1}H NMR (400 MHz, $CDCl_3$)

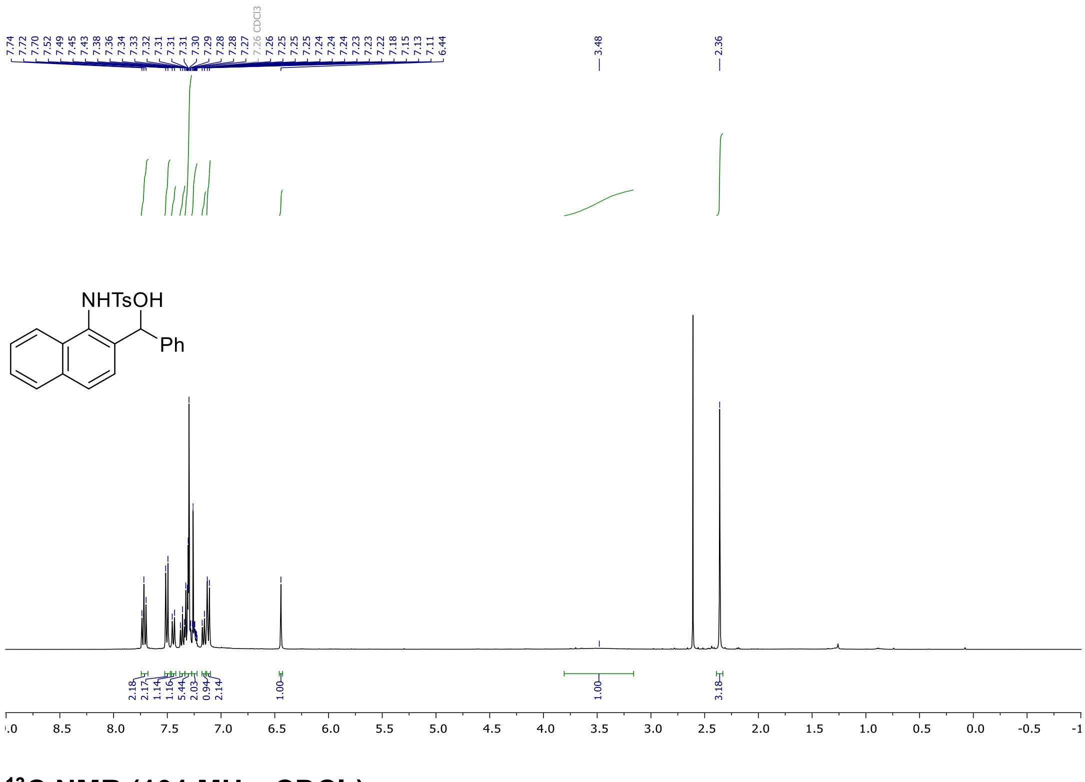


^{13}C NMR (101 MHz, $CDCl_3$)

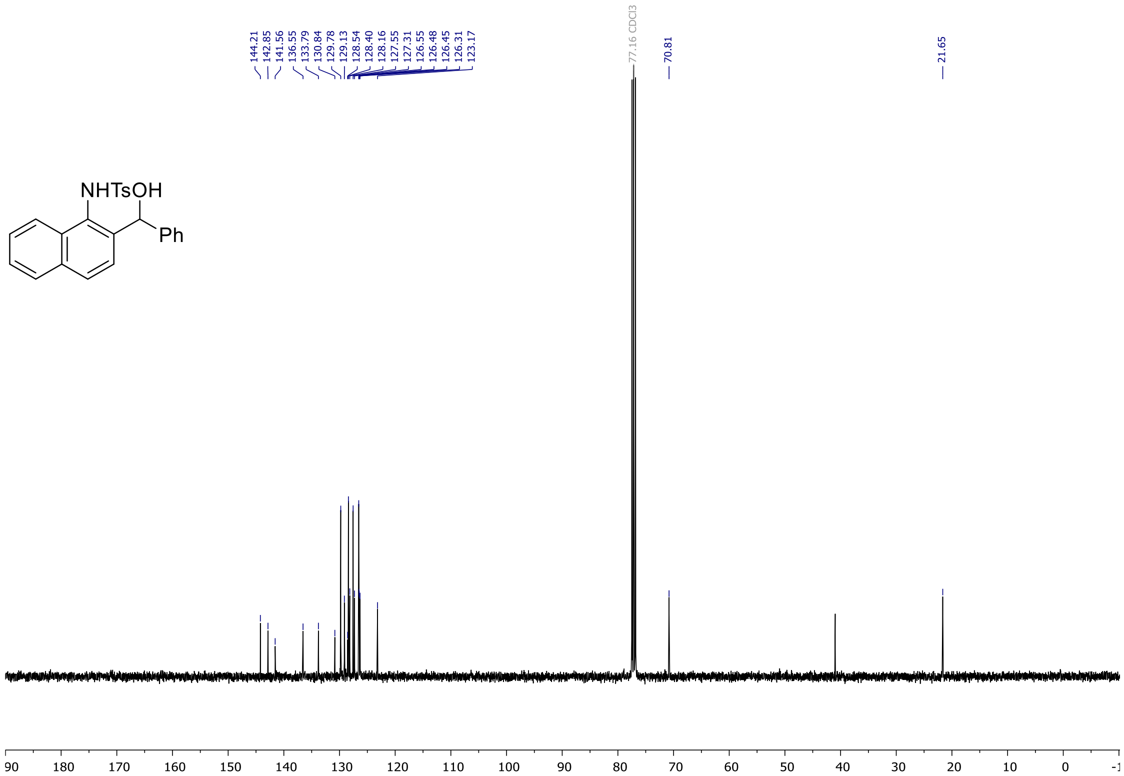


***N*-(2-(hydroxy(phenyl)methyl)naphthalen-1-yl)-4-methylbenzenesulfonamide (1u''')**

^{1}H NMR (400 MHz, $CDCl_3$)

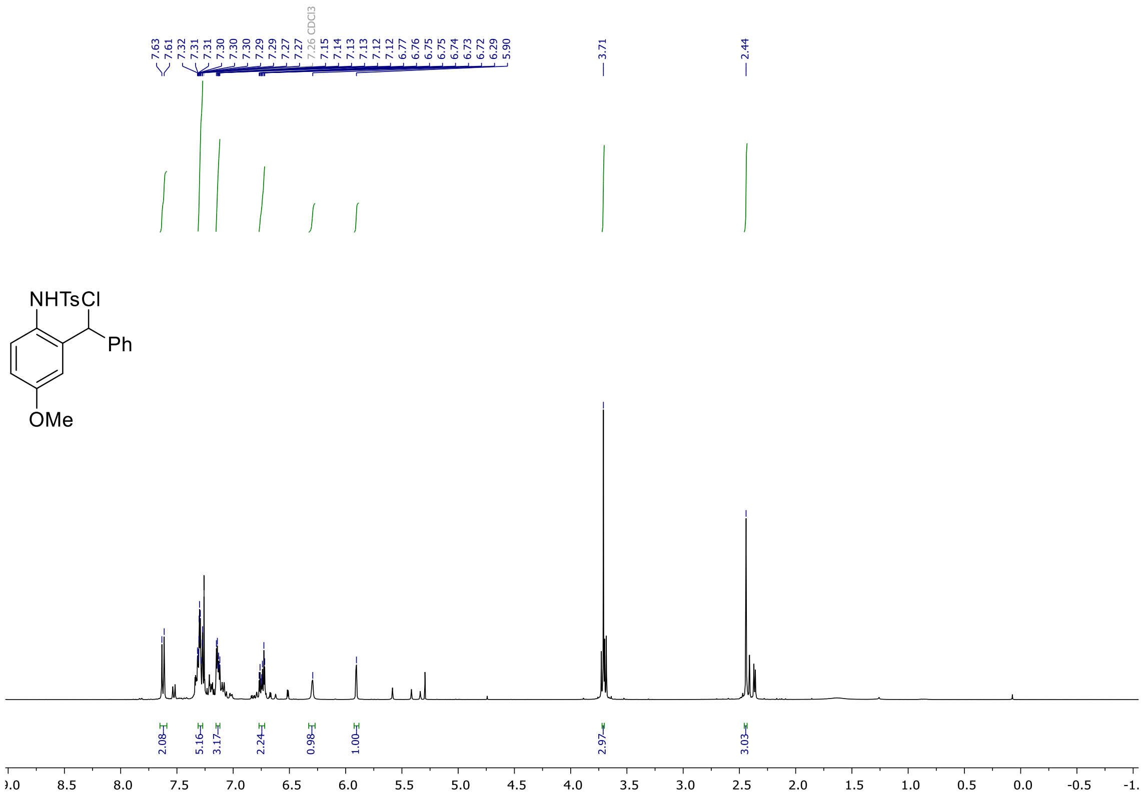


^{13}C NMR (101 MHz, $CDCl_3$)

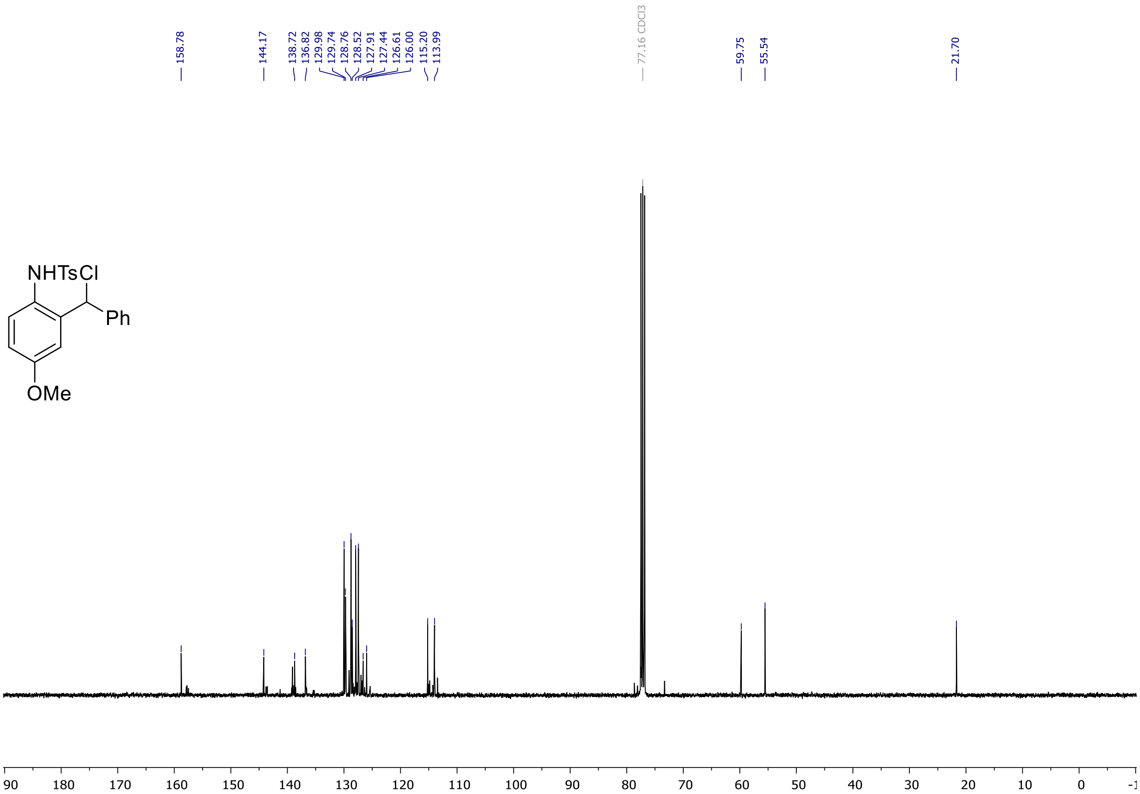


***N*-(2-(chloro(phenyl)methyl)-4-methoxyphenyl)-4-methylbenzenesulfonamide (1b)**

^{1}H NMR (400 MHz, $CDCl_3$)

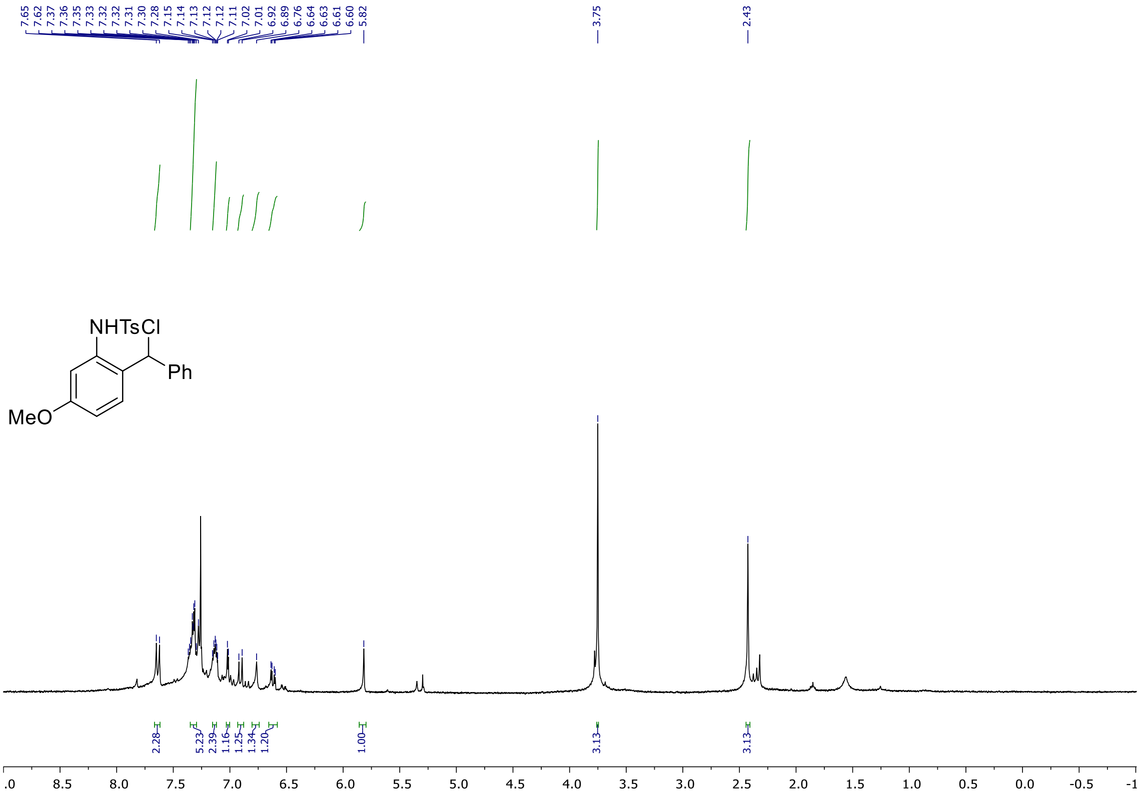


^{13}C NMR (101 MHz, $CDCl_3$)

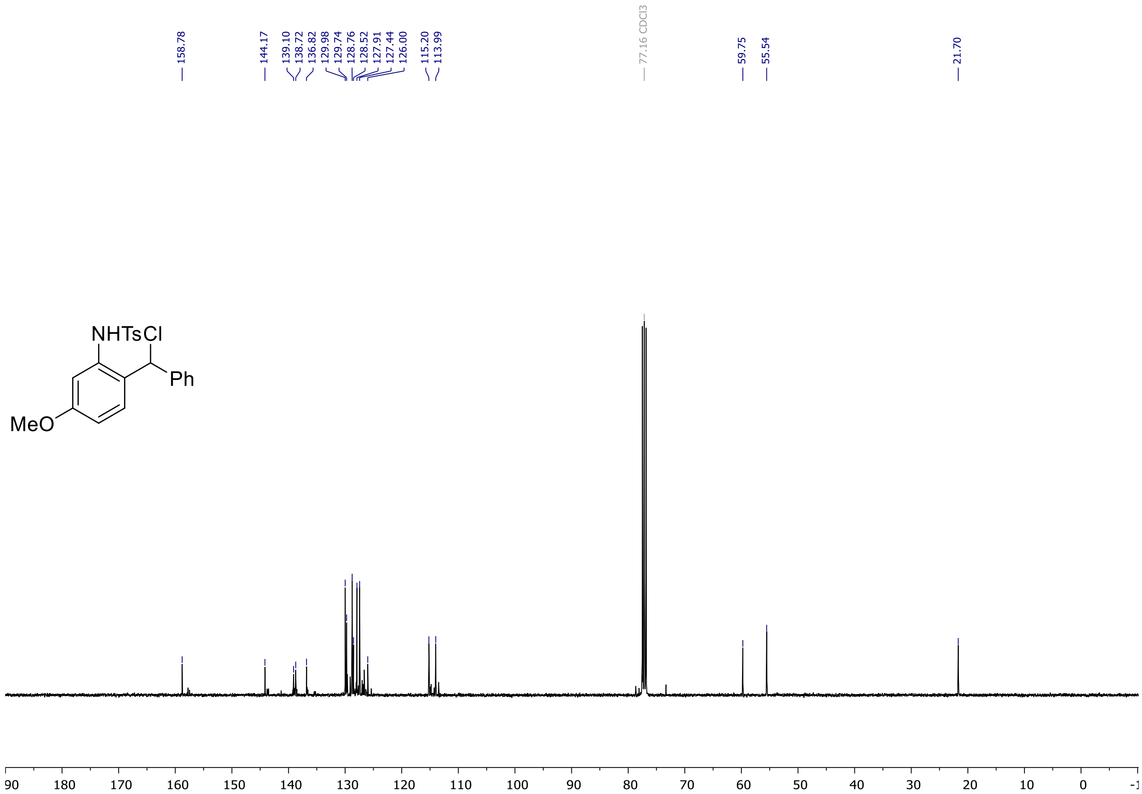


N-(2-(chloro(phenyl)methyl)-5-methoxyphenyl)-4-methylbenzenesulfonamide (1c)

^{1}H NMR (400 MHz, $CDCl_3$)

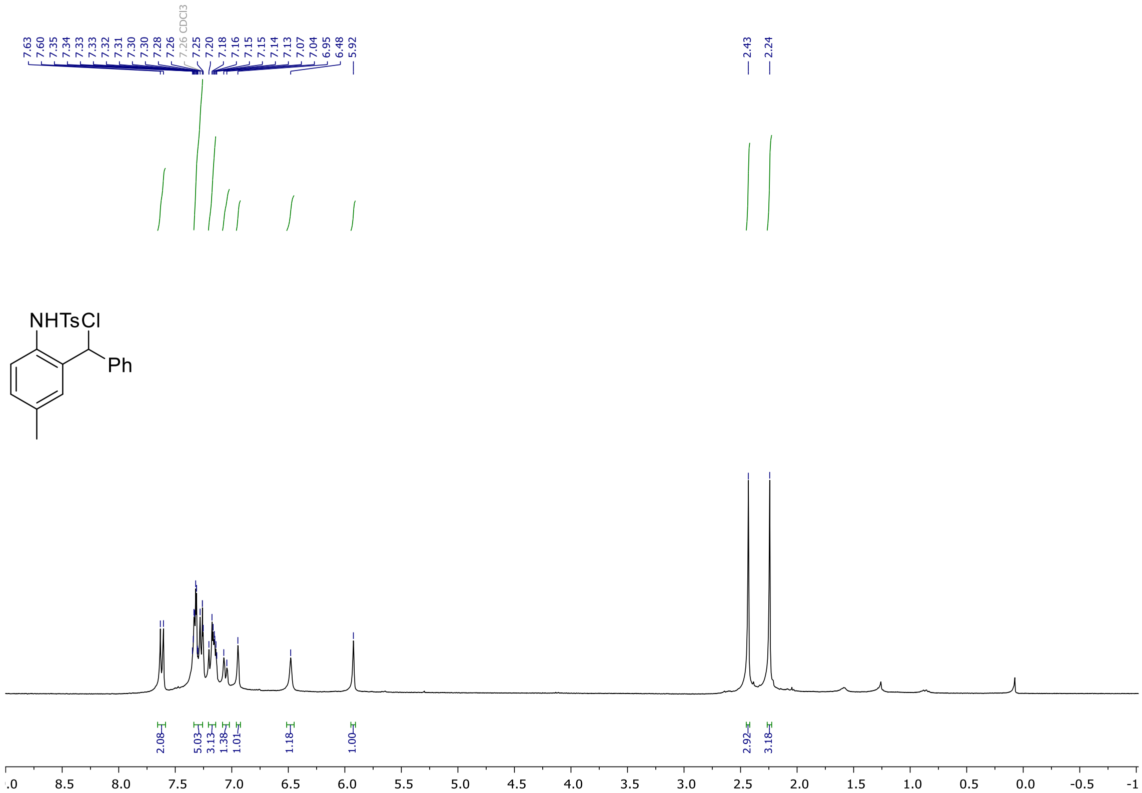


^{13}C NMR (101 MHz, $CDCl_3$)

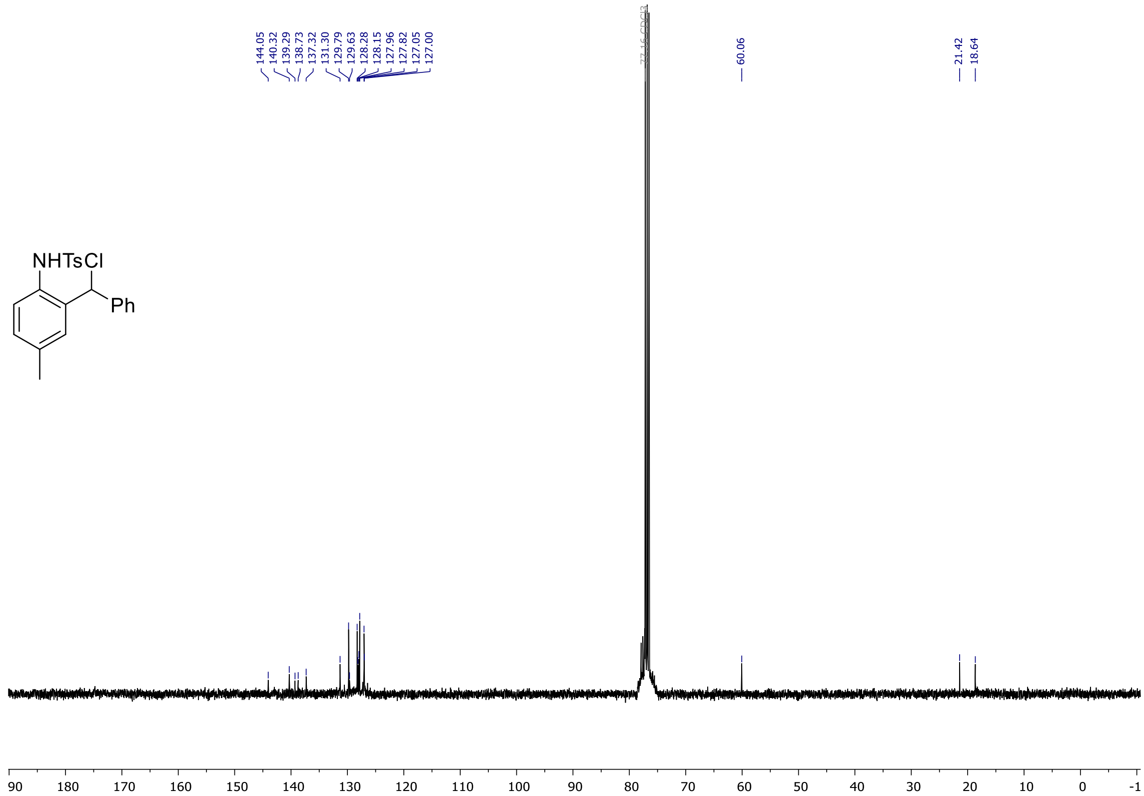


N-(2-(chloro(phenyl)methyl)-4-methylphenyl)-4-methylbenzenesulfonamide (1d)

^{1}H NMR (400 MHz, $CDCl_3$)

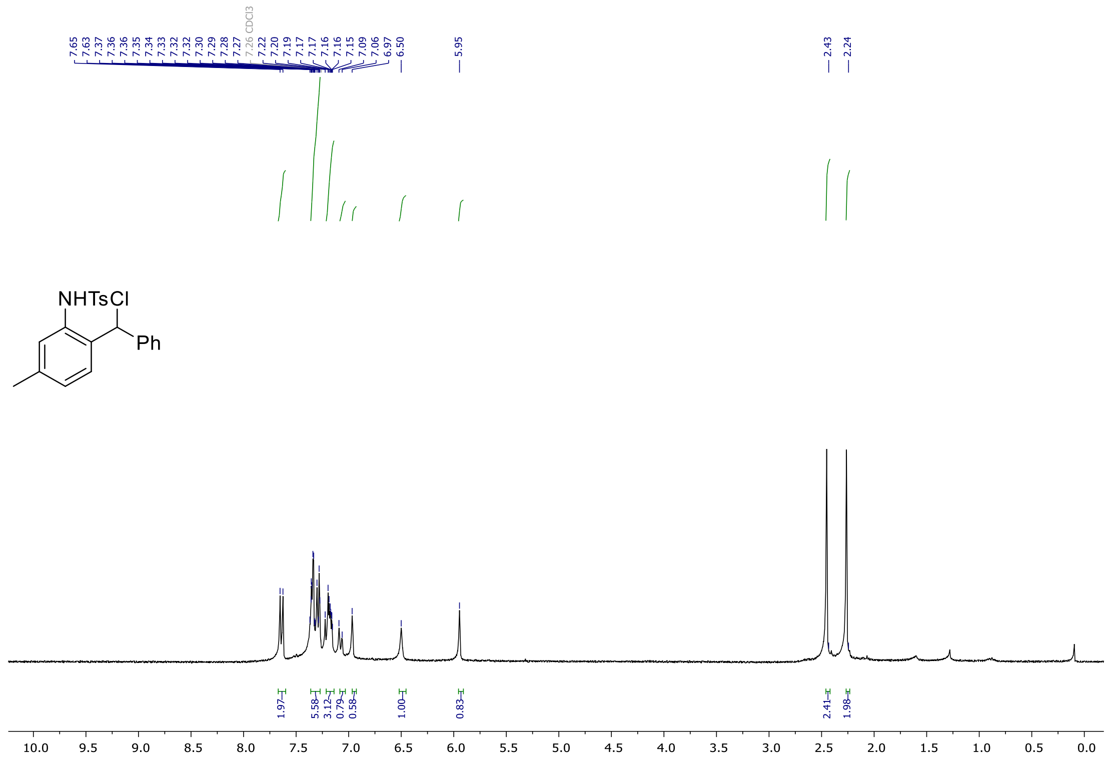


^{13}C NMR (101 MHz, $CDCl_3$)

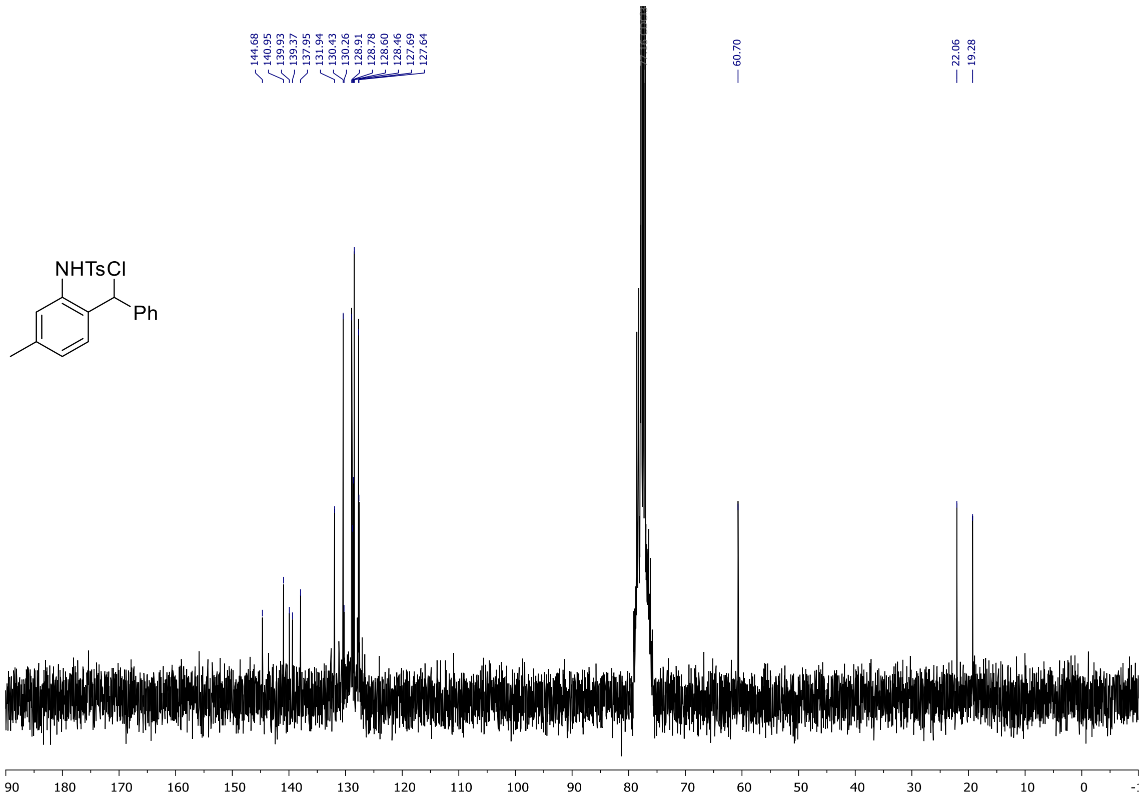


***N*-(2-(chloro(phenyl)methyl)-5-methylphenyl)-4-methylbenzenesulfonamide (1e)**

^{1}H NMR (400 MHz, $CDCl_3$)

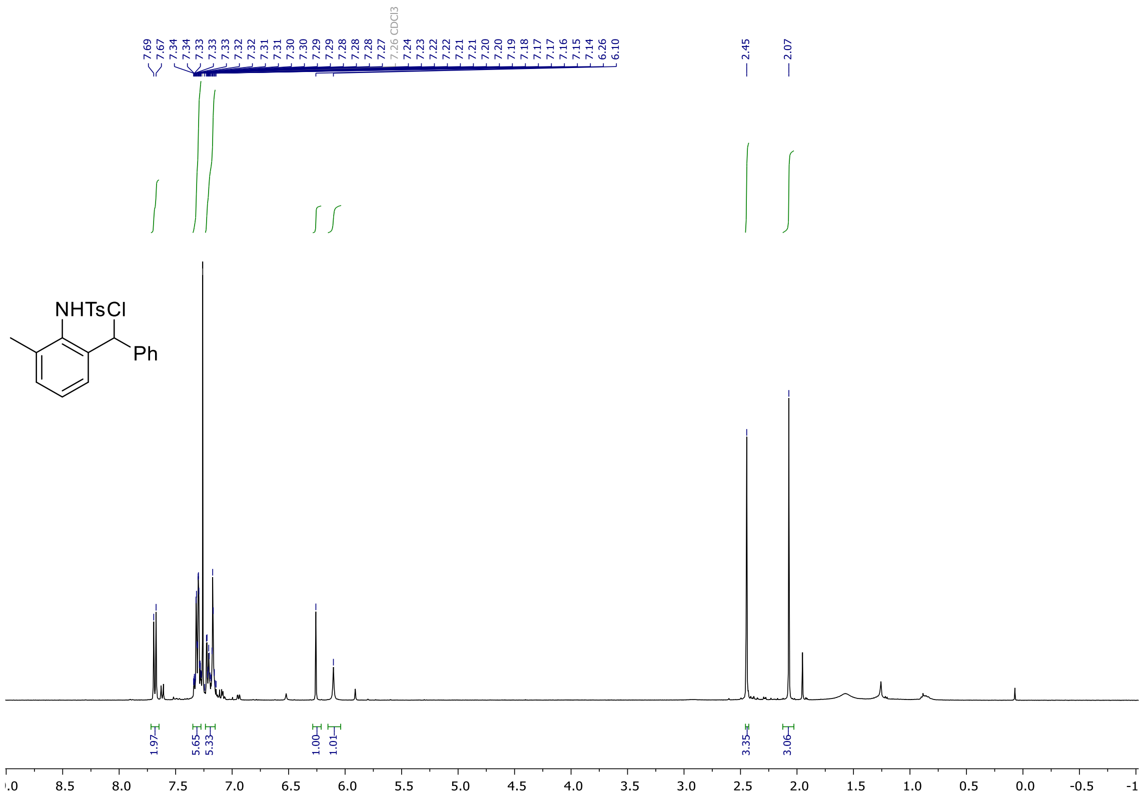


^{13}C NMR (101 MHz, $CDCl_3$)

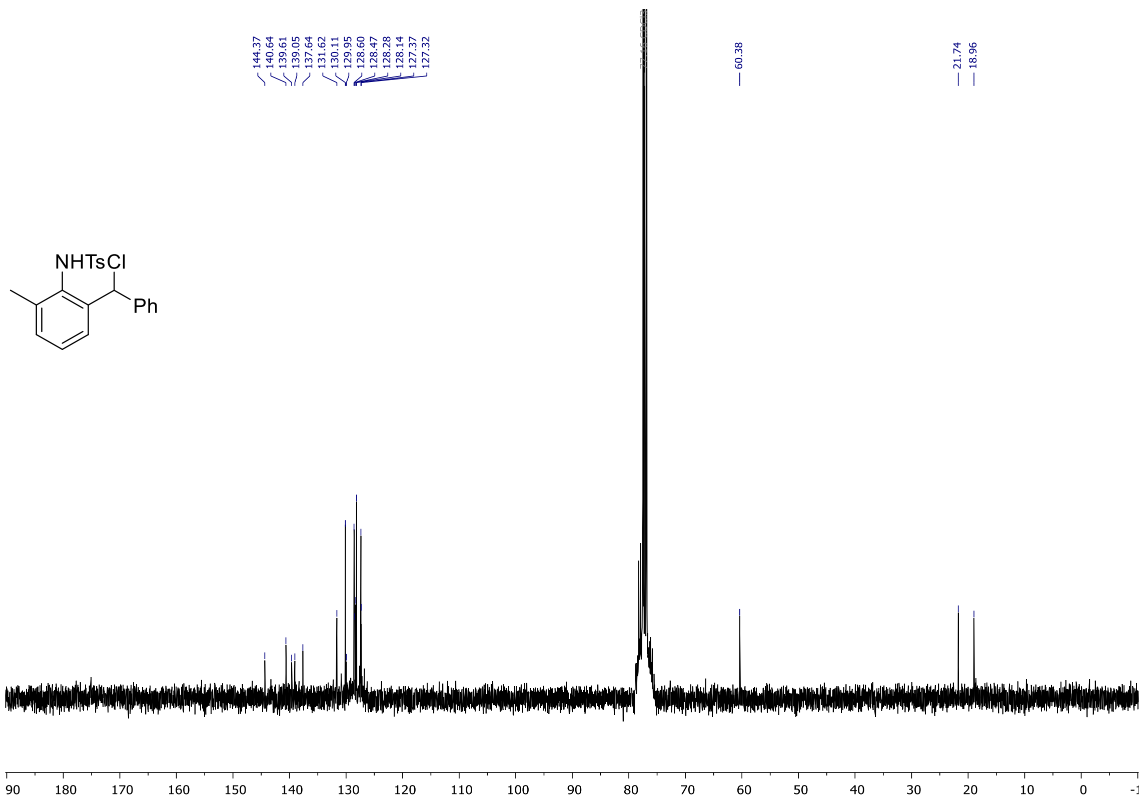


***N*-(2-(chloro(phenyl)methyl)-6-methylphenyl)-4-methylbenzenesulfonamide methanol (1f)**

[1]H NMR (400 MHz, $CDCl_3$)

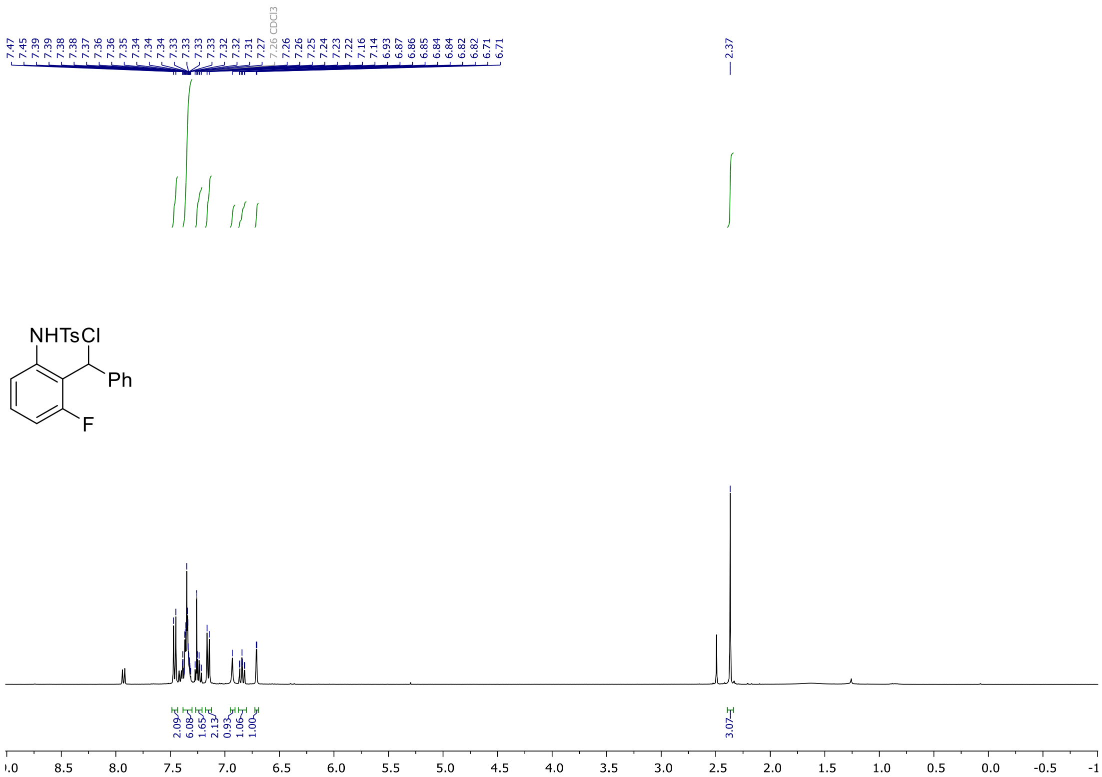


[13]C NMR (101 MHz, $CDCl_3$)

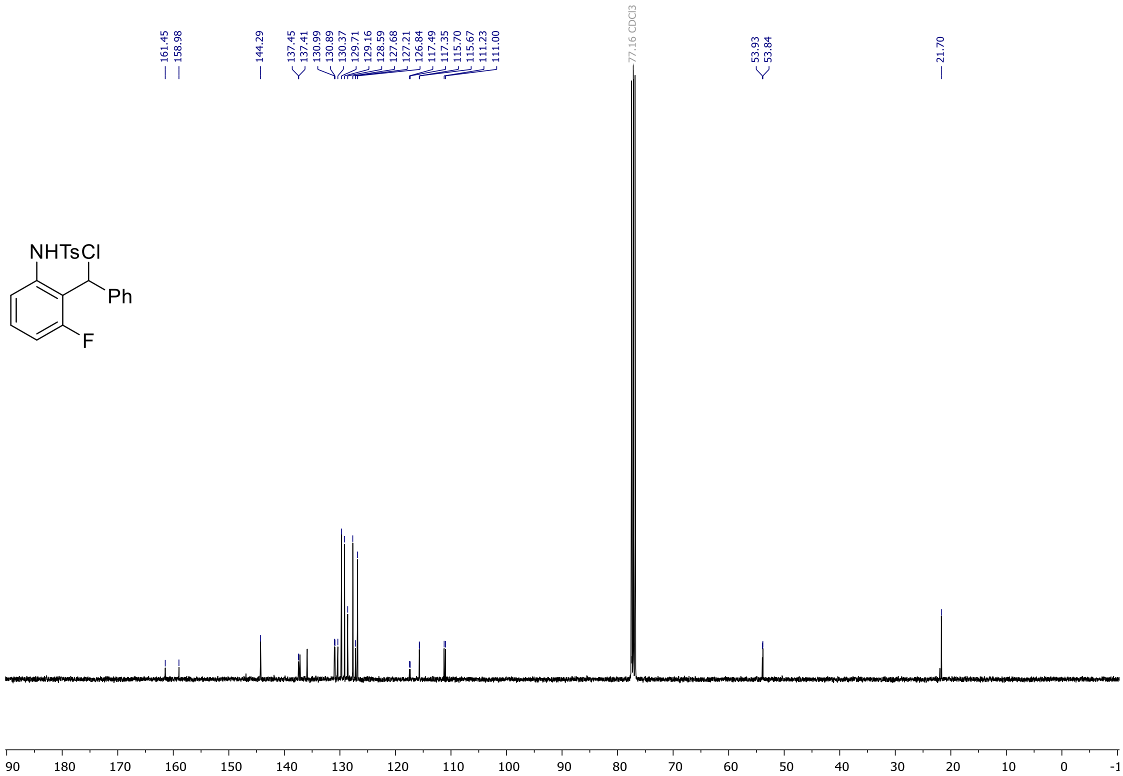


_N_-(3-fluoro-2-(chloro(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1g)

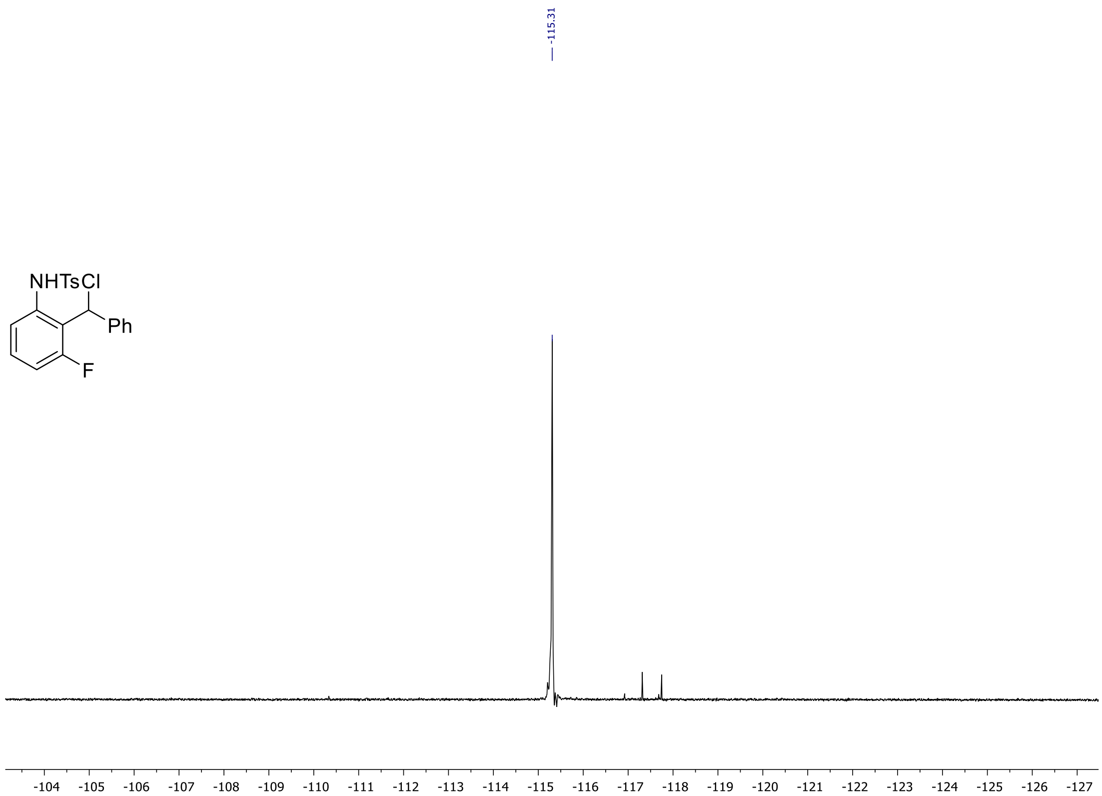
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

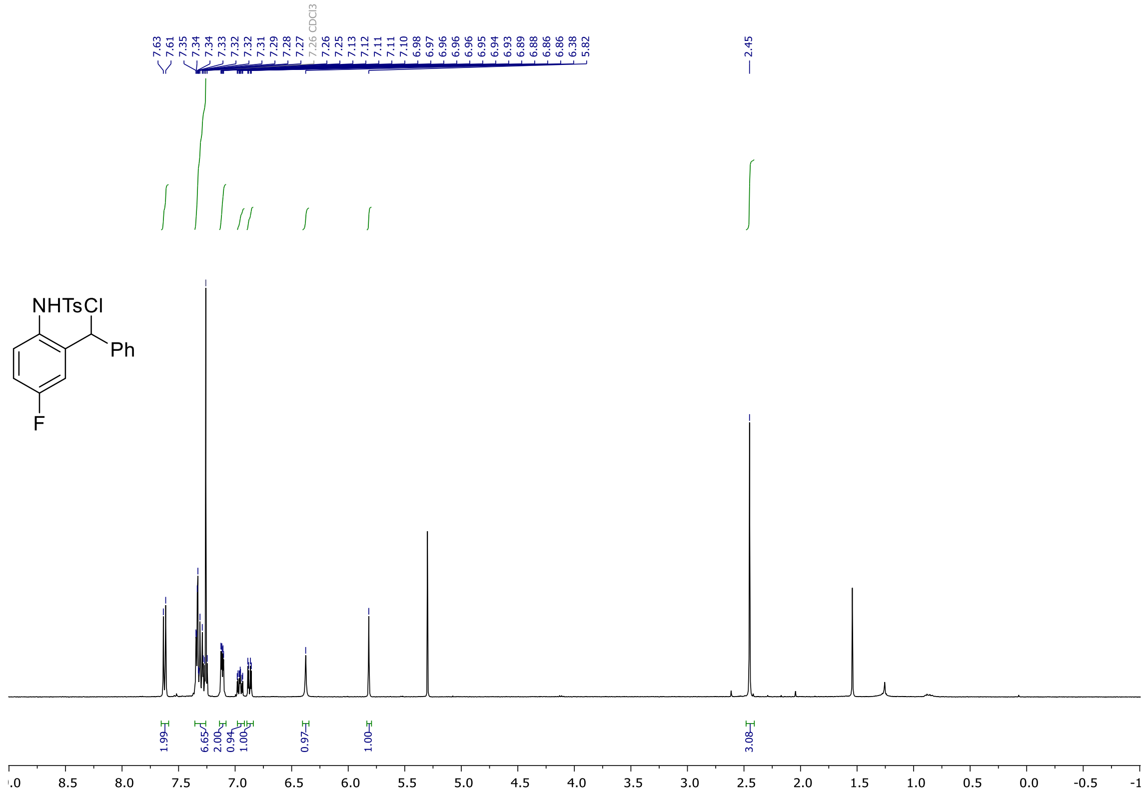


^{19}F NMR (376 MHz, $CDCl_3$)

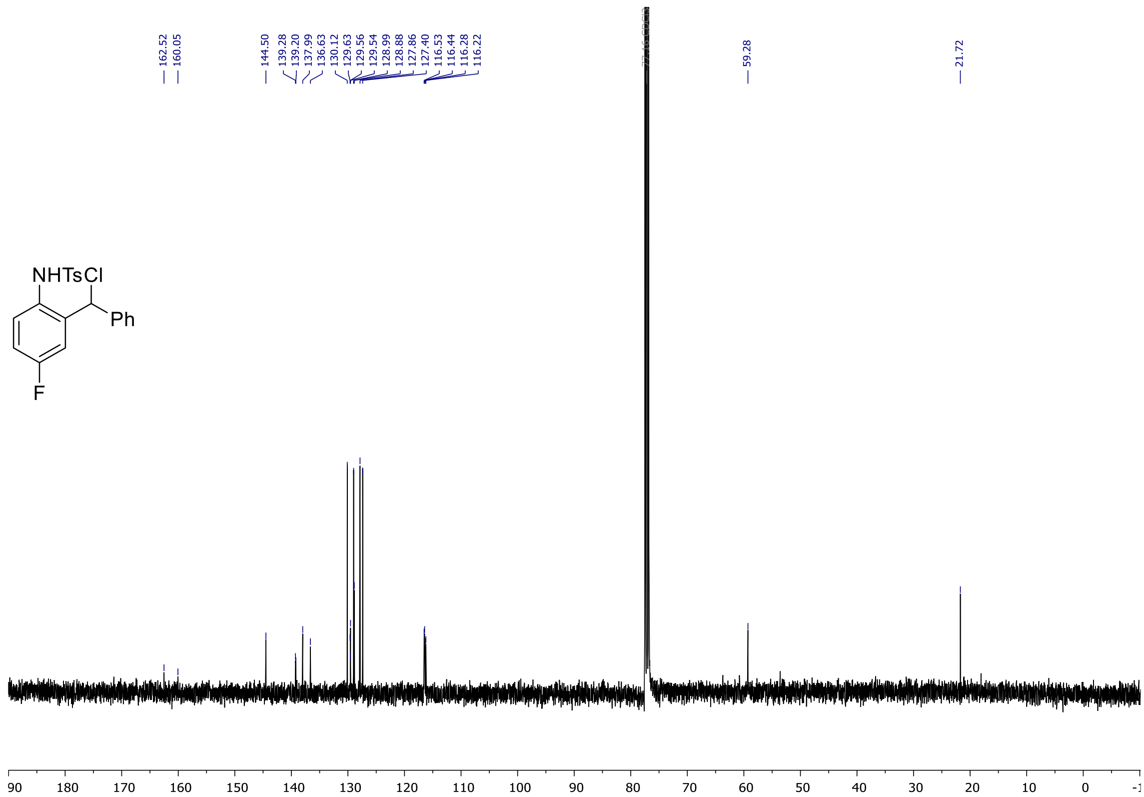


***N*-(4-fluoro-2-(chloro(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1h)**

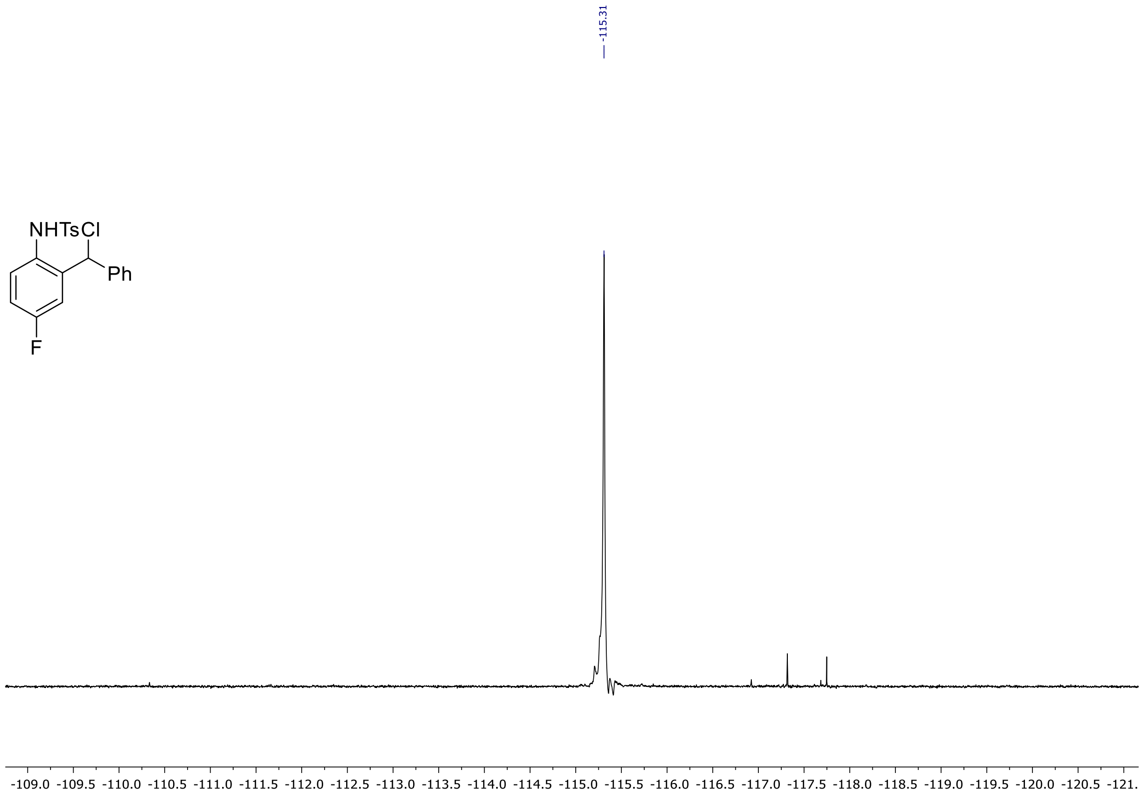
[1]H NMR (400 MHz, $CDCl_3$)



[13]C NMR (101 MHz, $CDCl_3$)

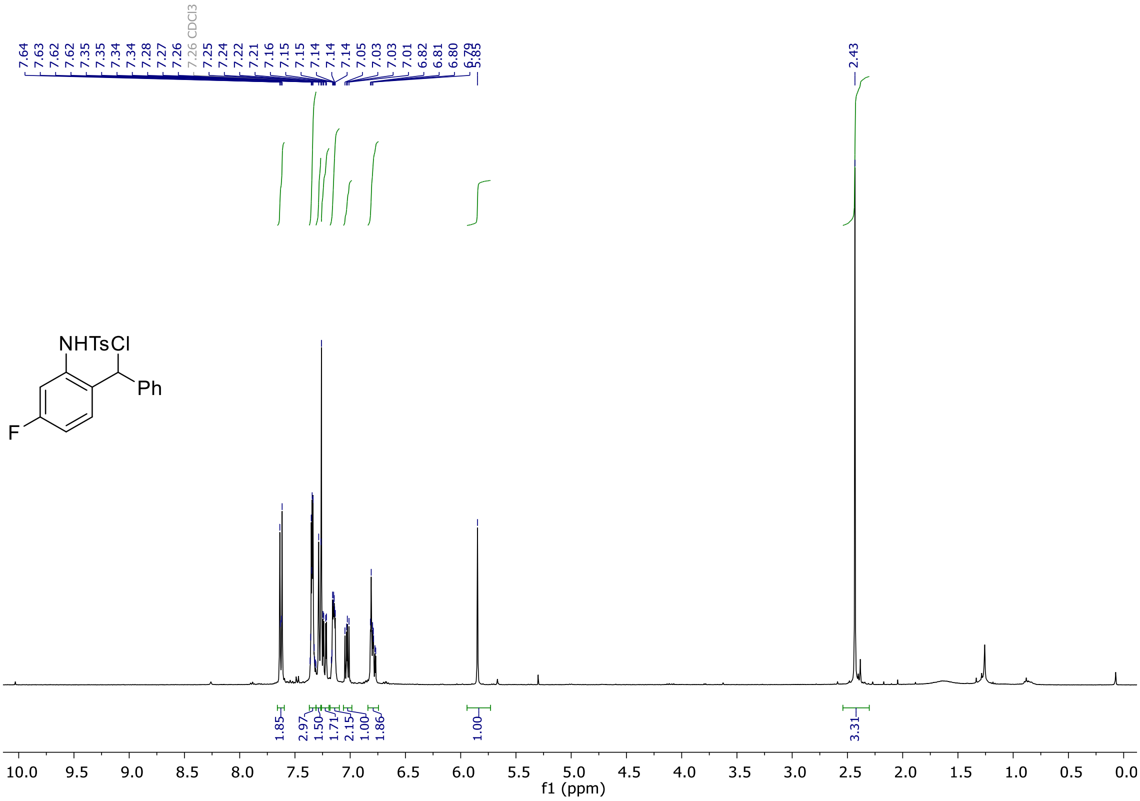


^{19}F NMR (376 MHz, $CDCl_3$)

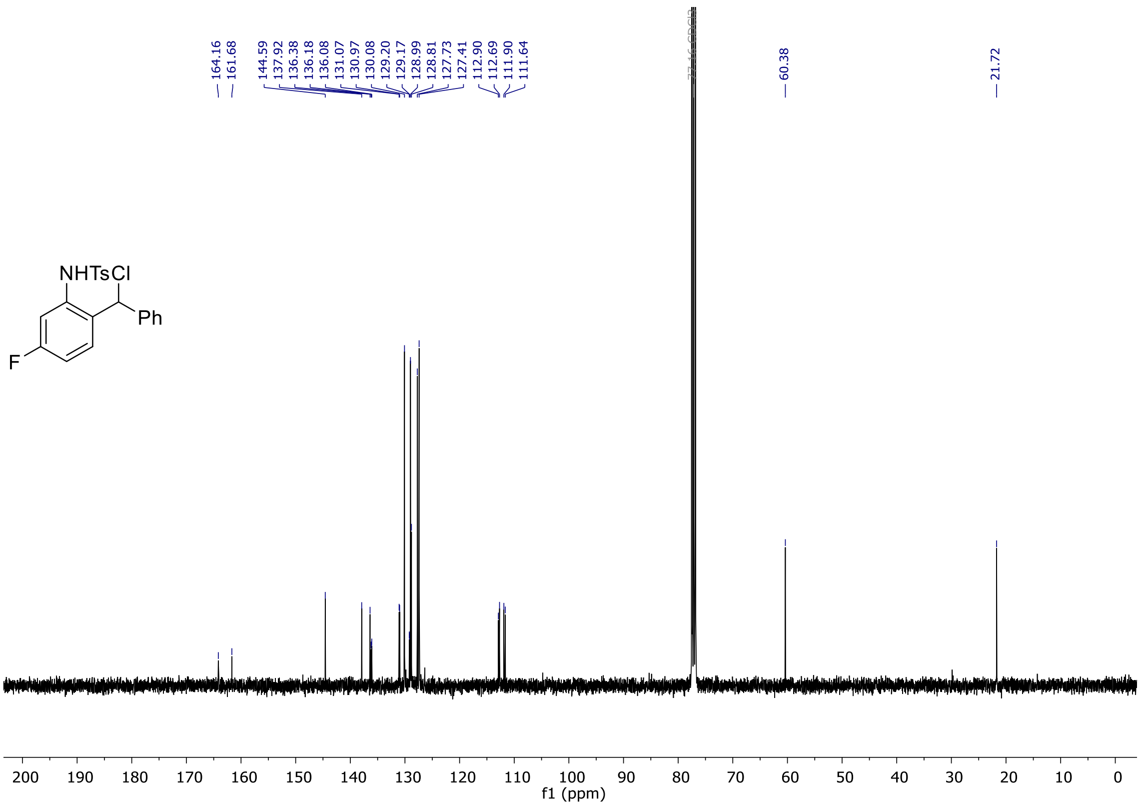


_N_-(5-fluoro-2-(chloro(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1i)

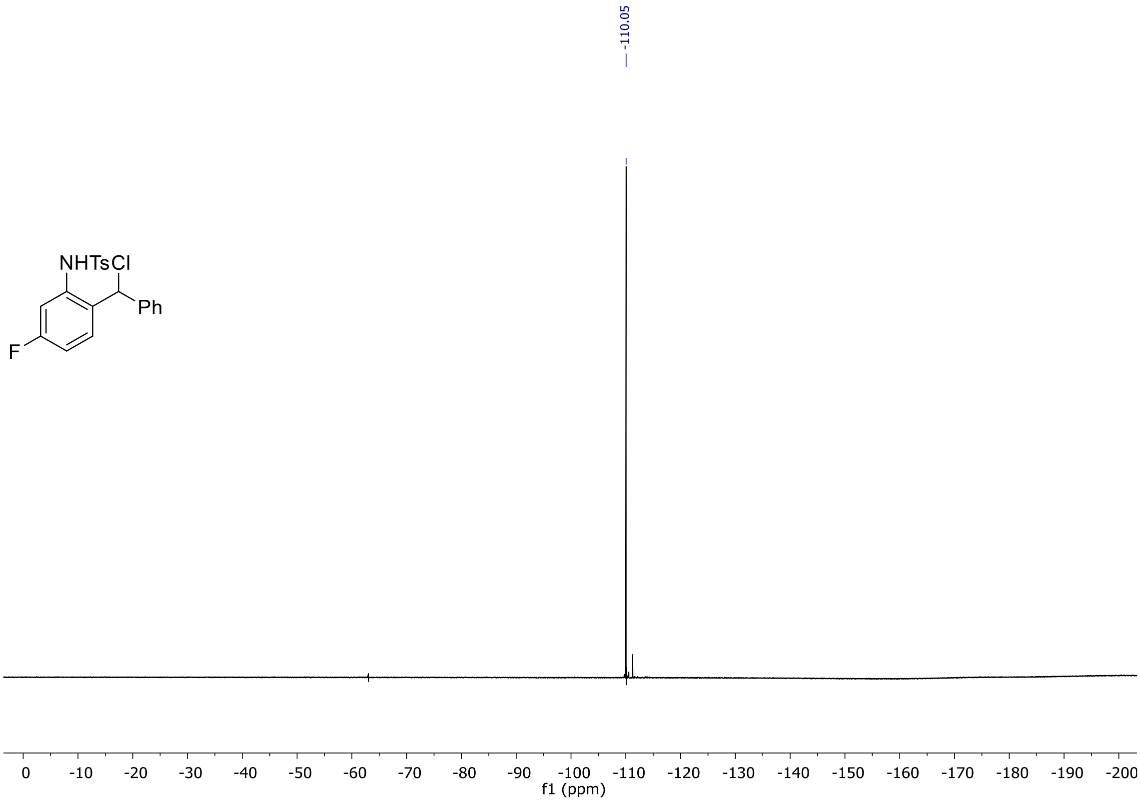
^{1}H NMR (400 MHz, CDCl$_3$)



^{13}C NMR (101 MHz, CDCl$_3$)

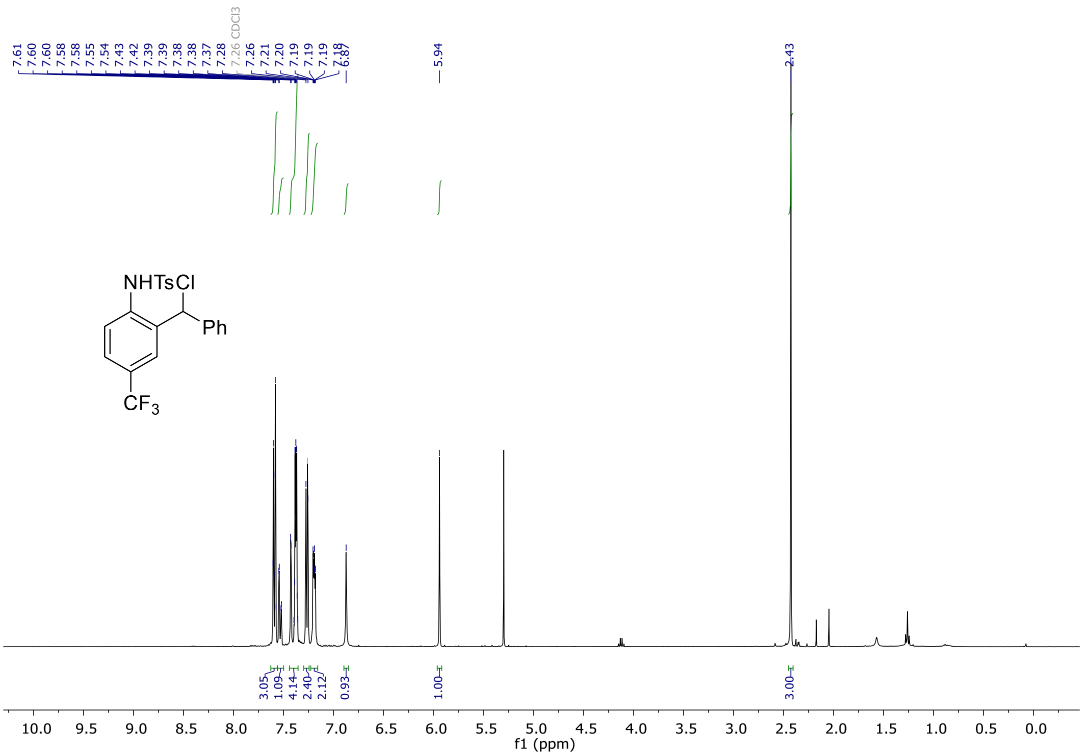


^{19}F NMR (376 MHz, CDCl$_3$)

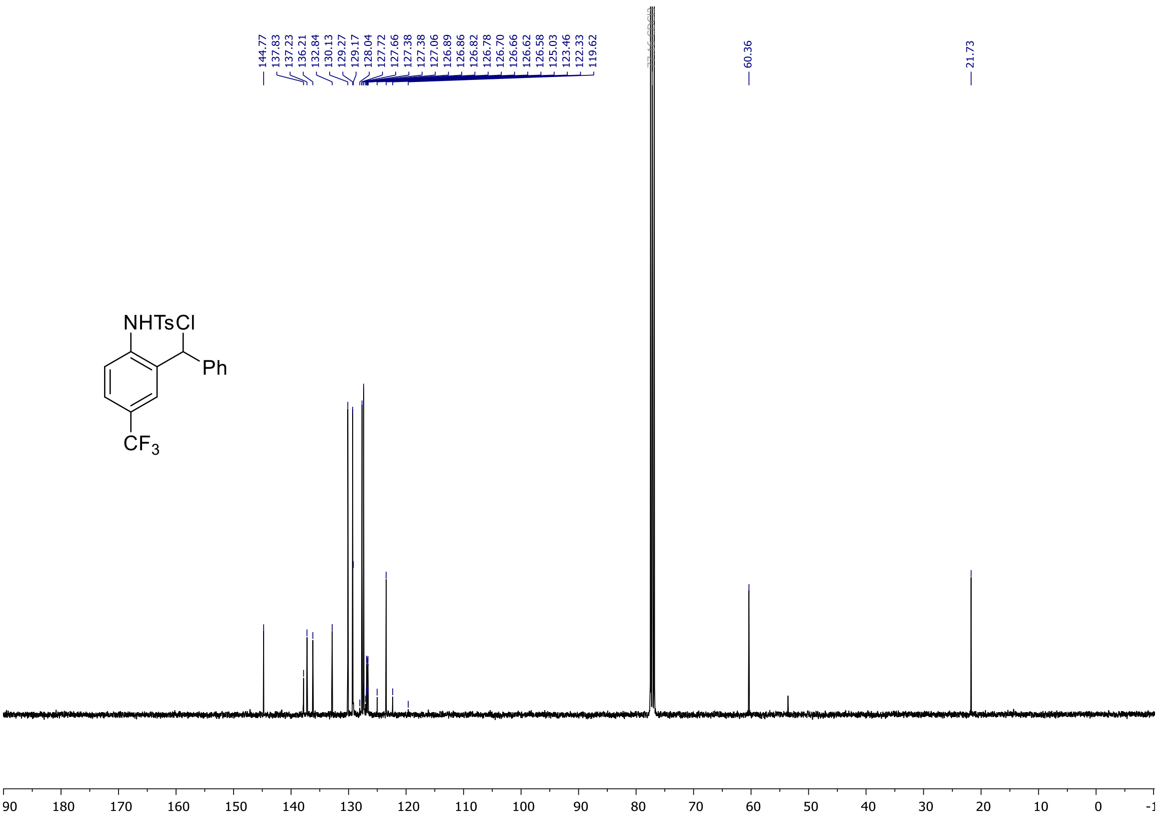


***N*-(2-(chloro(phenyl)methyl)-4-(trifluoromethyl)phenyl)-4-methylbenzenesulfonamide (1m)**

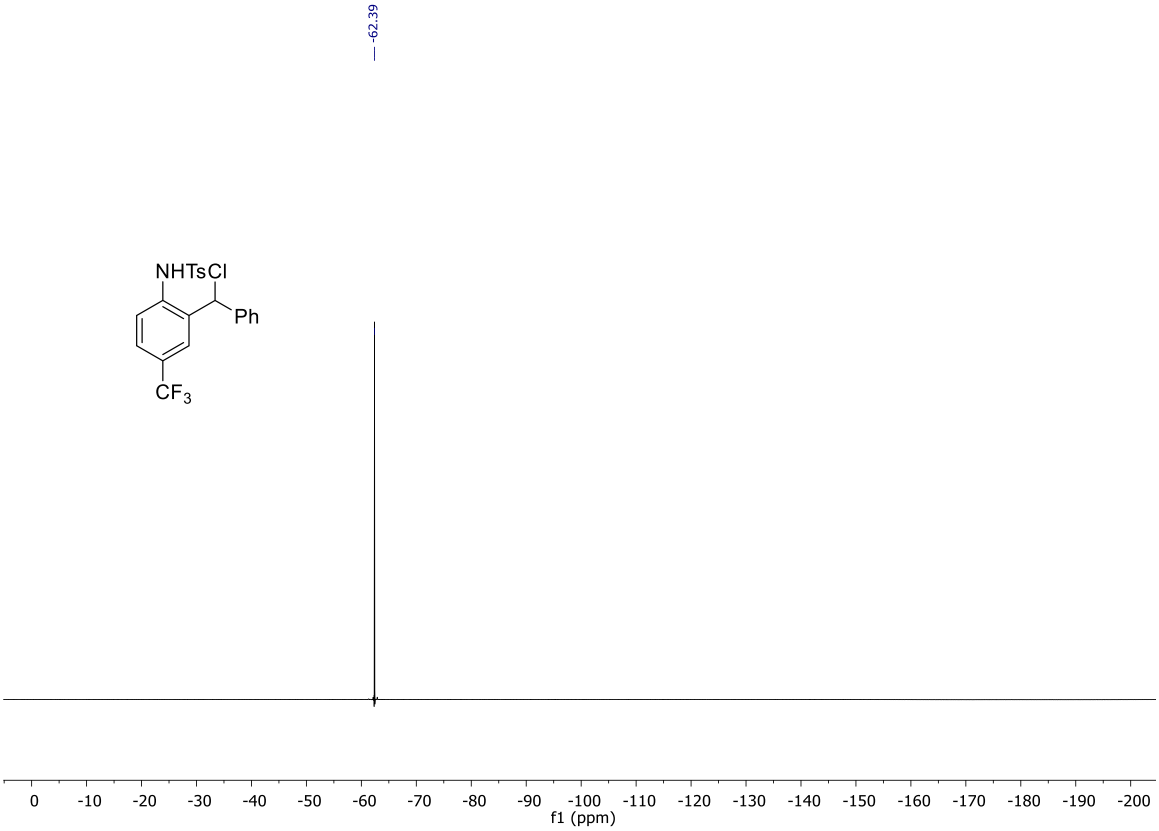
^{1}H NMR (400 MHz, CDCl$_3$)



^{13}C NMR (101 MHz, CDCl$_3$)

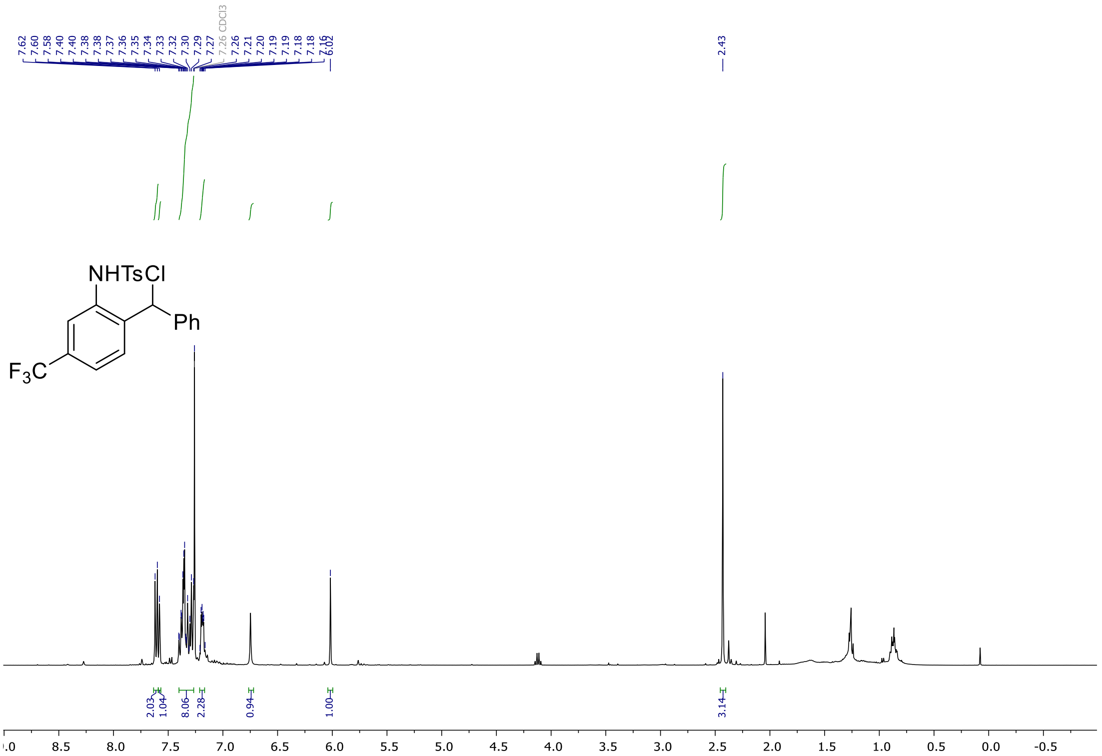


^{19}F NMR (376 MHz, CDCl$_3$)

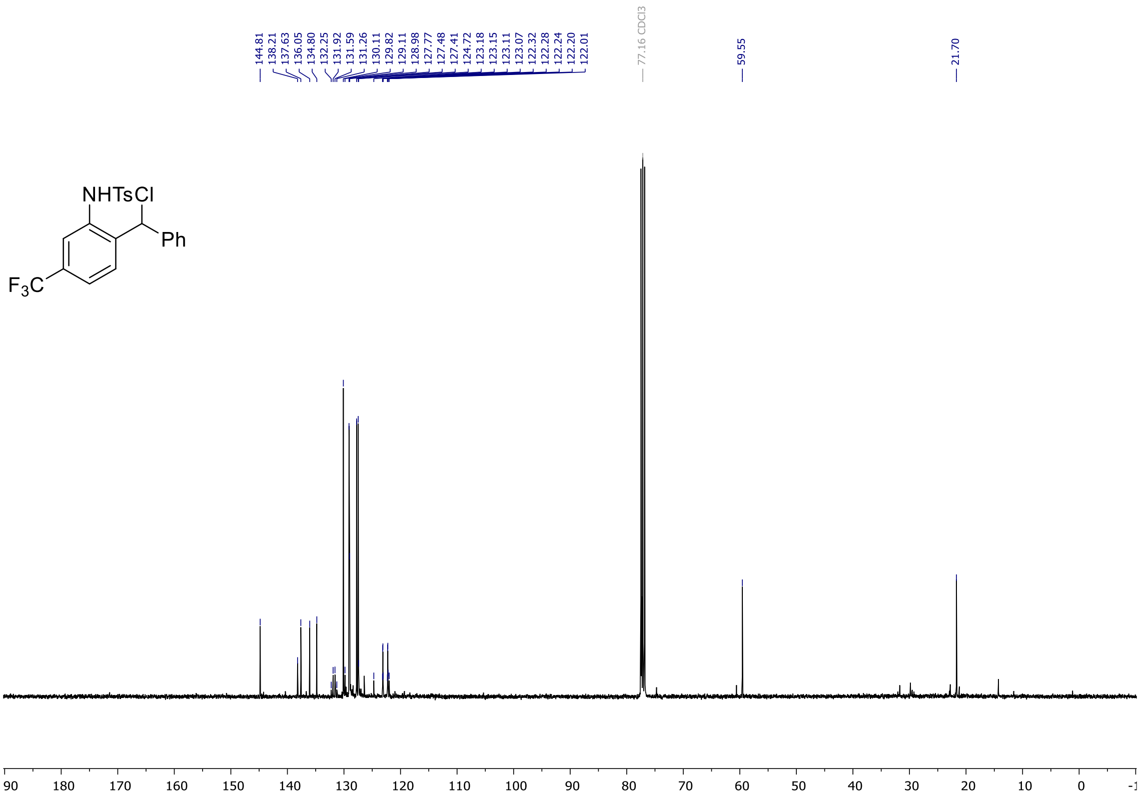


***N*-(2-(chloro(phenyl)methyl)-5-(trifluoromethyl)phenyl)-4-methylbenzenesulfonamide (1n)**

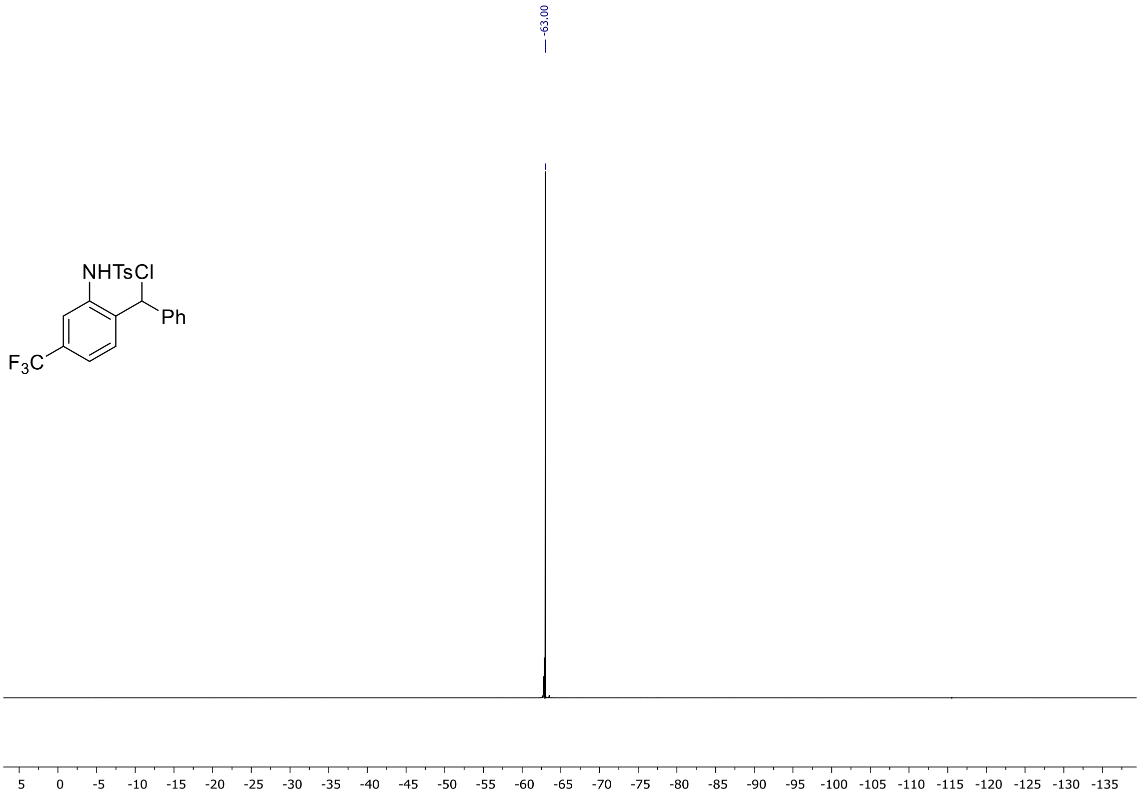
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)

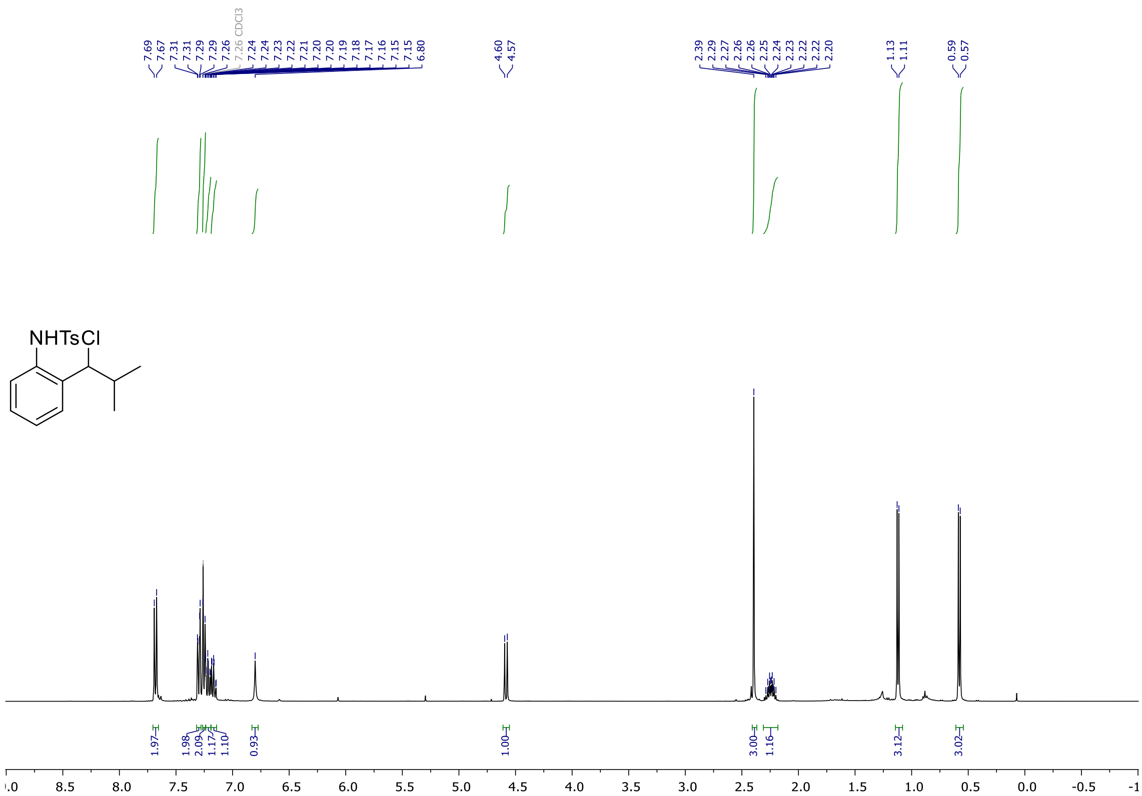


^{19}F NMR (376 MHz, $CDCl_3$)

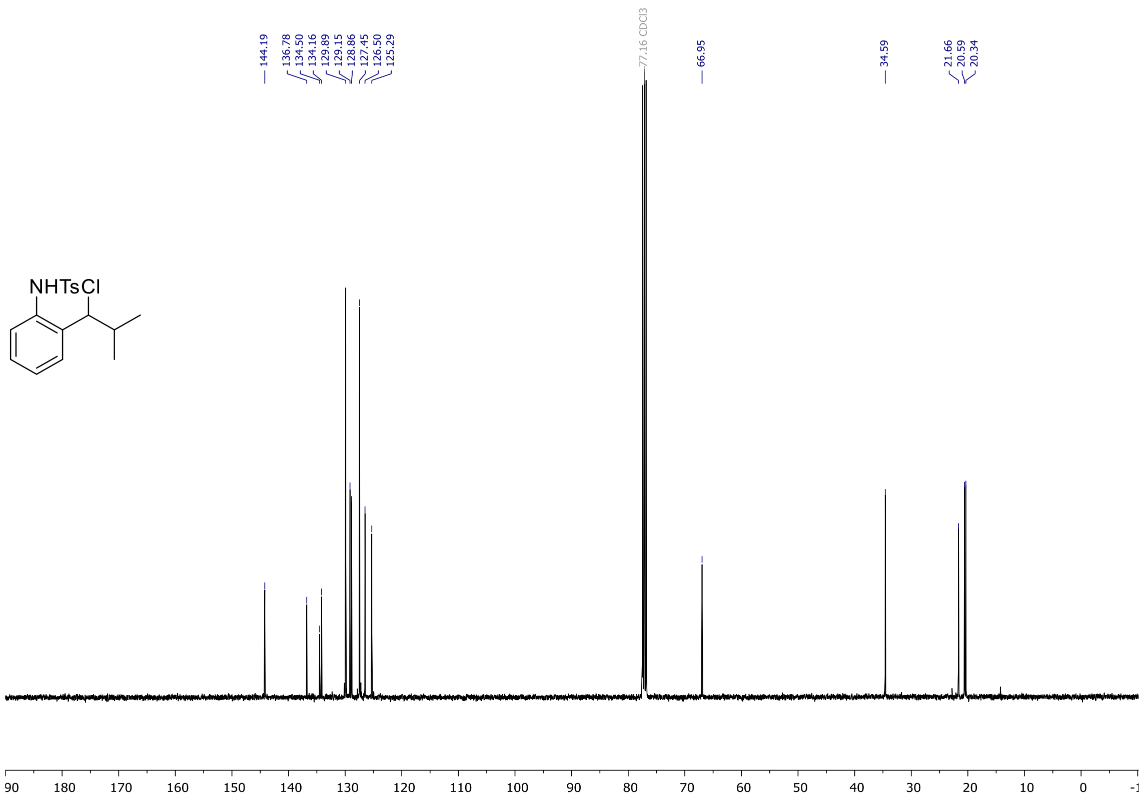


N-(2-(1-chloro-2-methylpropyl)phenyl)-4-methylbenzenesulfonamide (1q)

^{1}H NMR (400 MHz, $CDCl_3$)

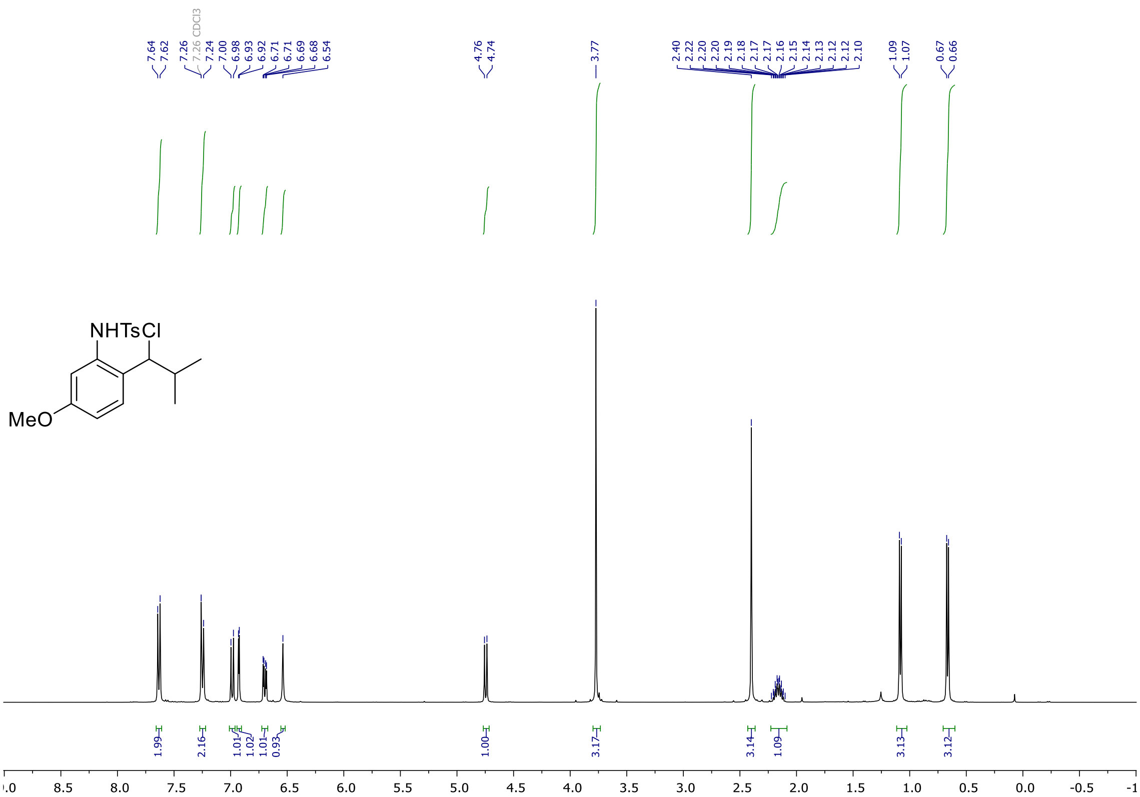


^{13}C NMR (101 MHz, $CDCl_3$)

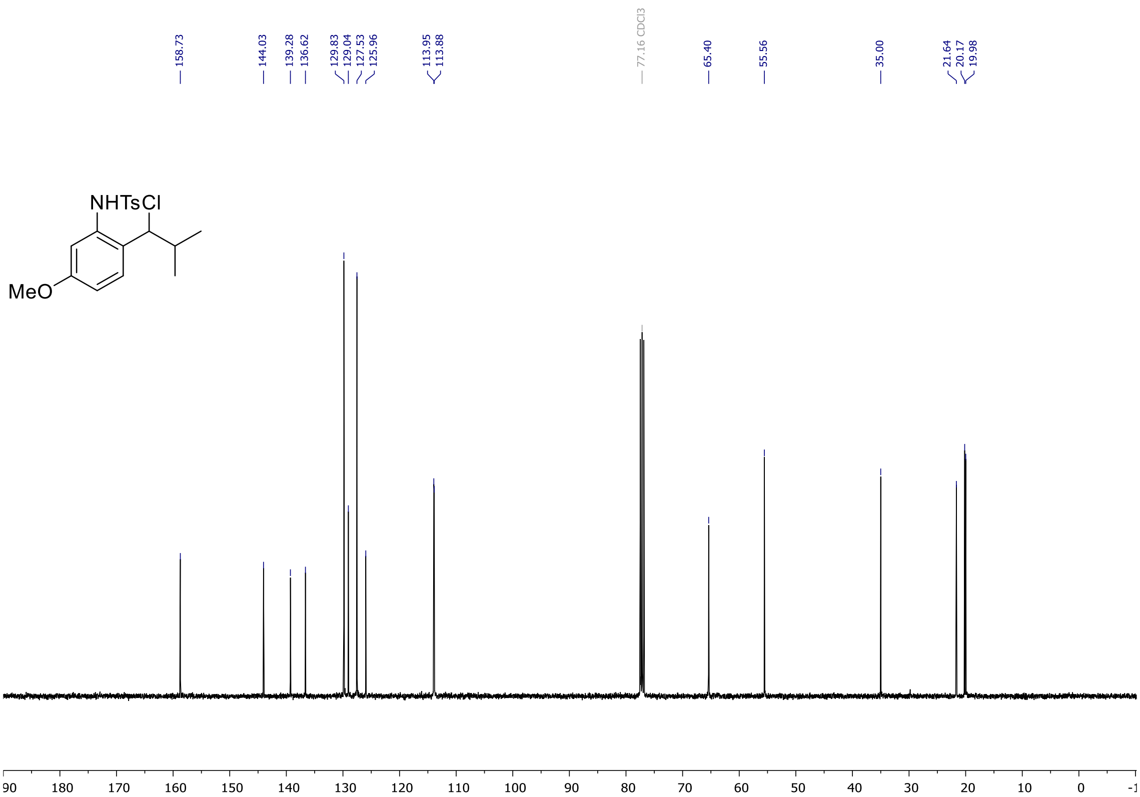


***N*-(2-(1-chloro-2-methylpropyl)-5-methoxyphenyl)-4-methylbenzenesulfonamide (1r)**

^{1}H NMR (400 MHz, CDCl$_3$)

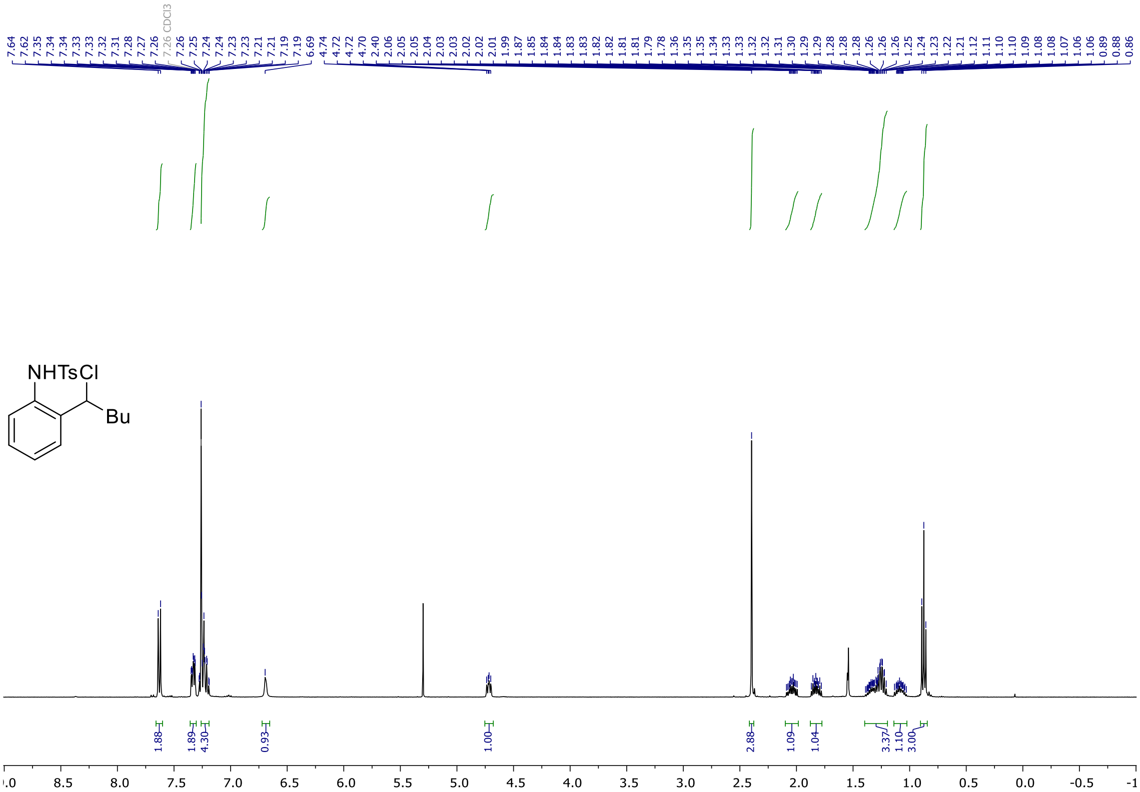


^{13}C NMR (101 MHz, CDCl$_3$)

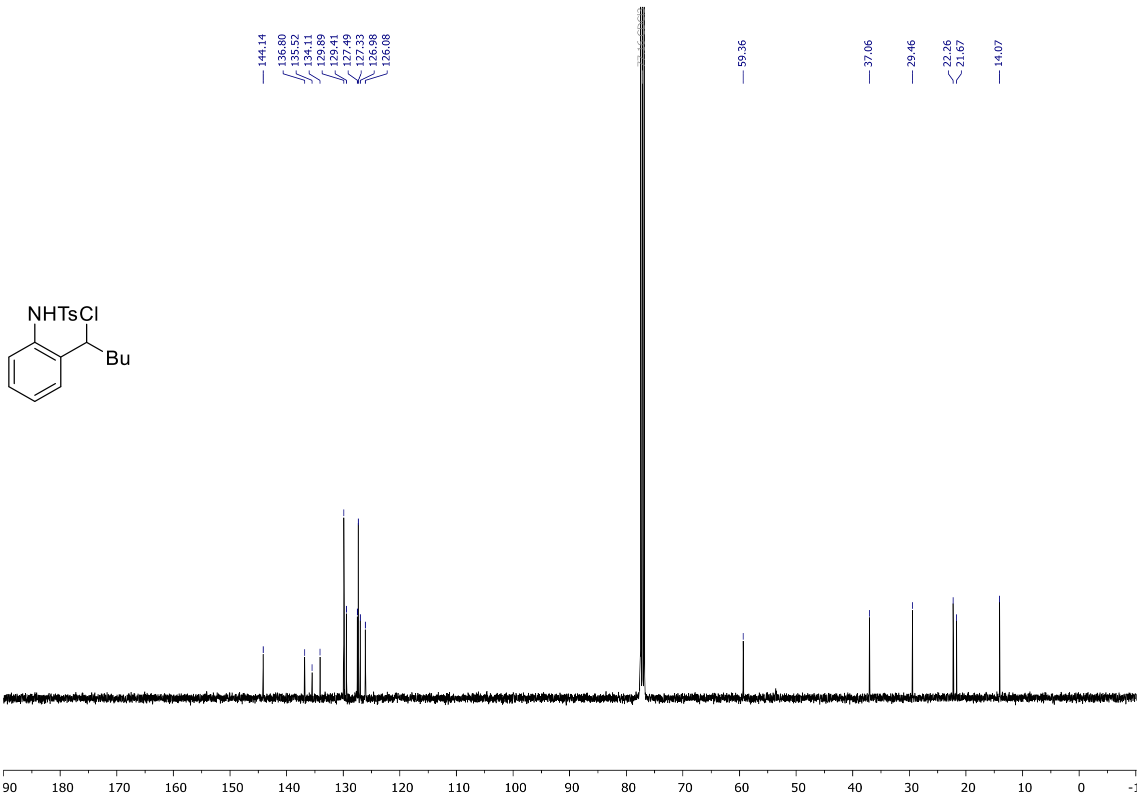


N-(2-(1-chloropentyl)phenyl)-4-methylbenzenesulfonamide (1s)

^{1}H NMR (400 MHz, $CDCl_3$)

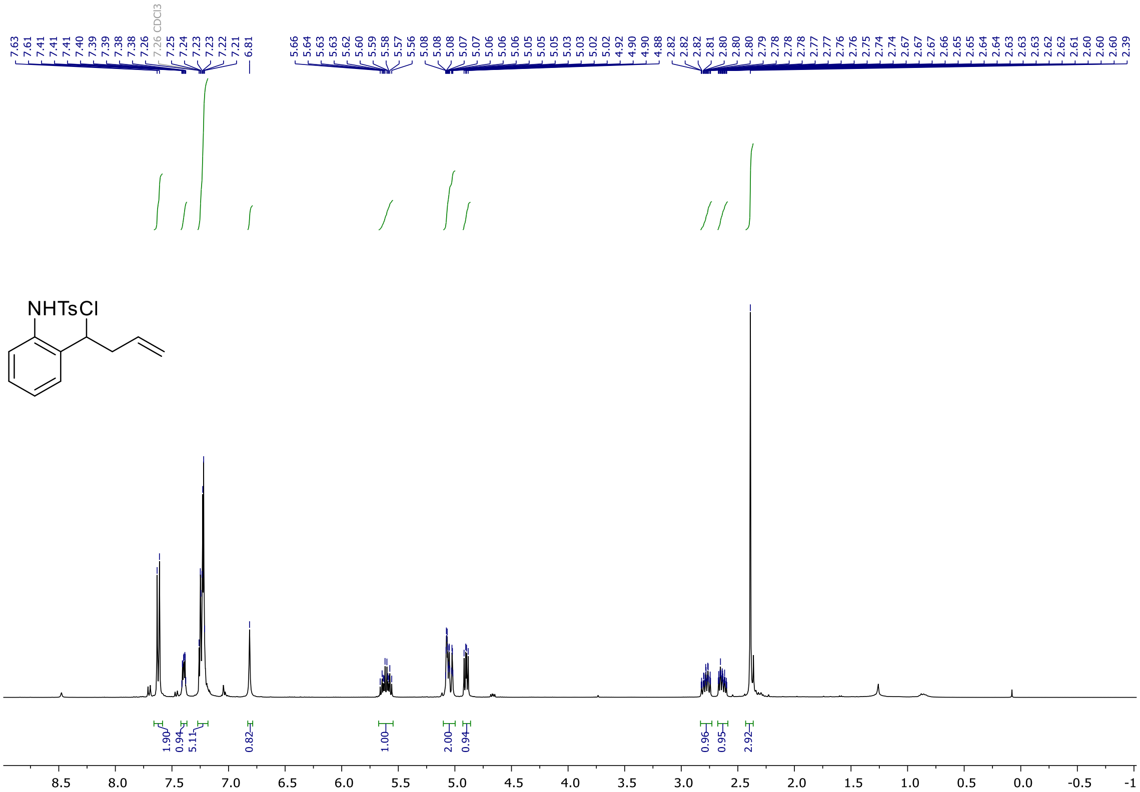


^{13}C NMR (101 MHz, $CDCl_3$)

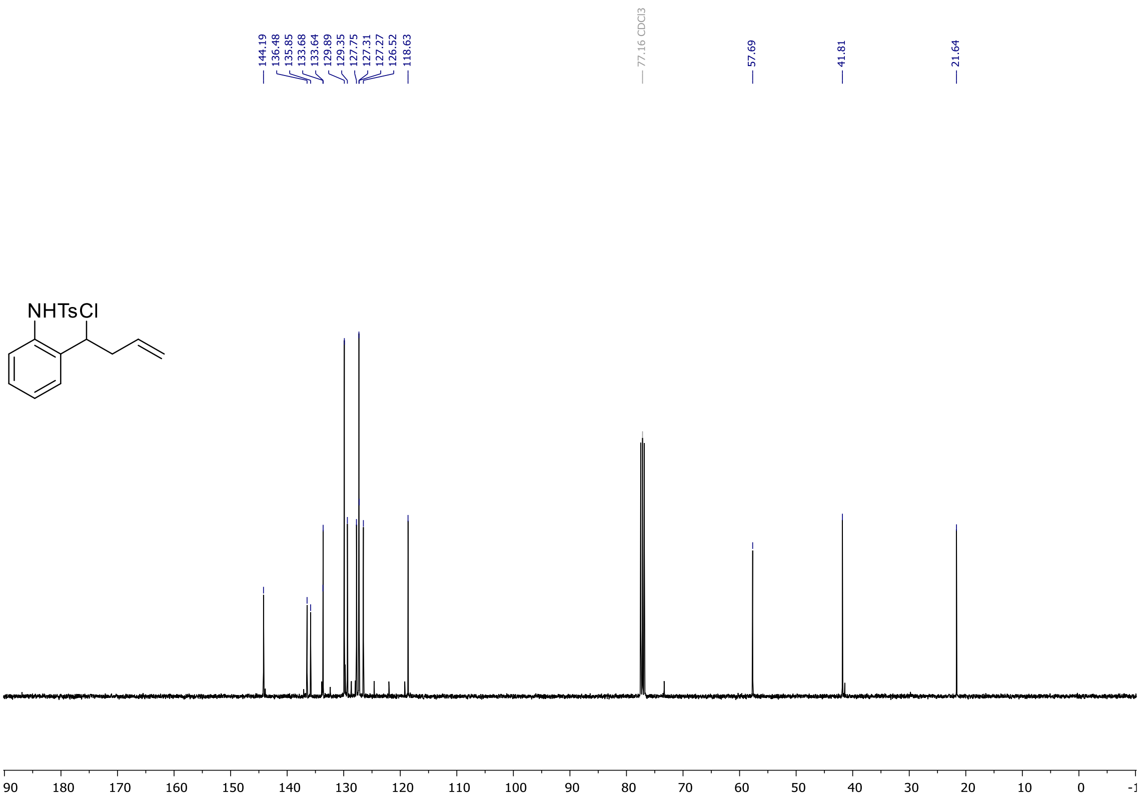


N-(2-(1-chlorobut-3-en-1-yl)phenyl)-4-methylbenzenesulfonamide (1t)

^{1}H NMR (400 MHz, $CDCl_3$)

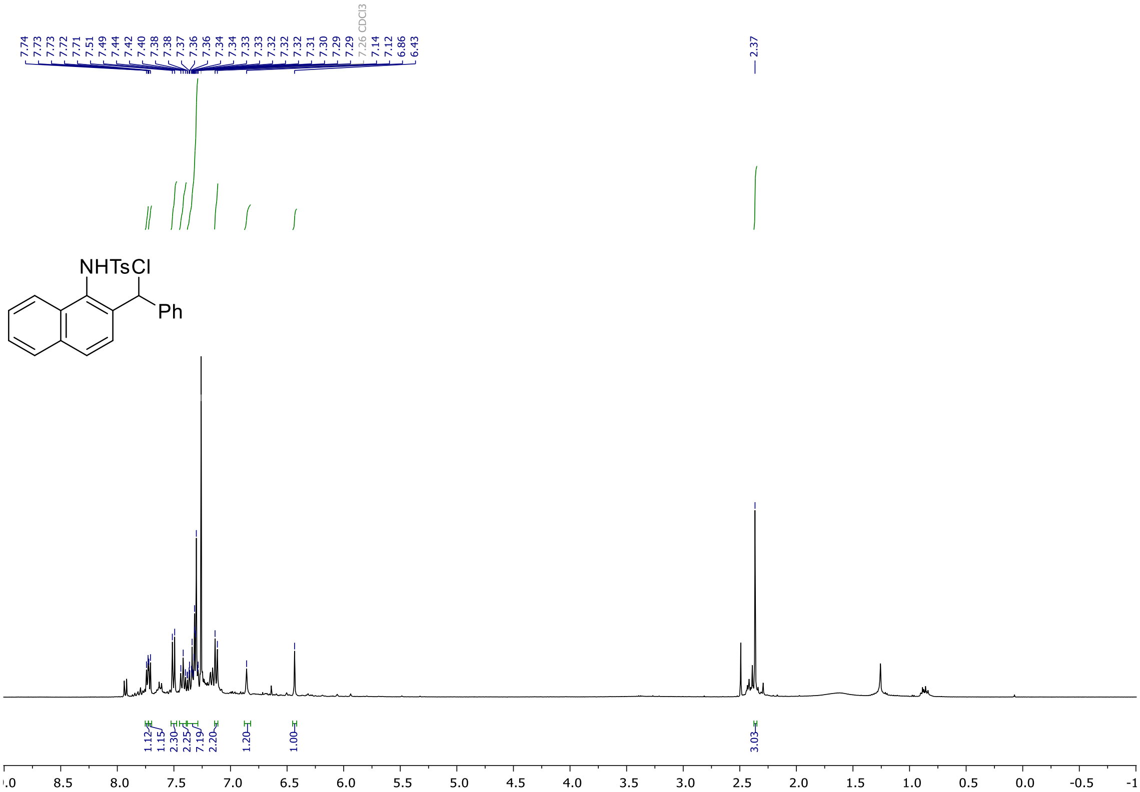


^{13}C NMR (101 MHz, $CDCl_3$)

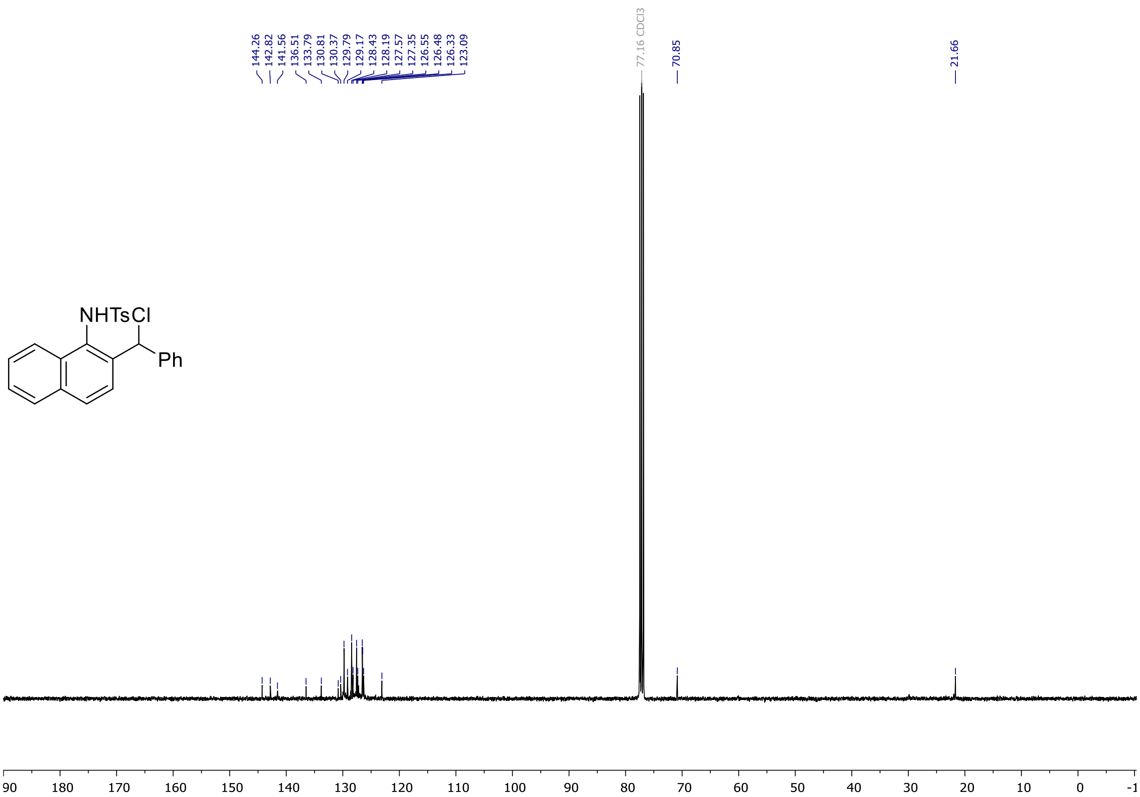


N-(2-(chloro(phenyl)methyl)naphthalen-1-yl)-4-methylbenzenesulfonamide (1u)

^{1}H NMR (400 MHz, $CDCl_3$)

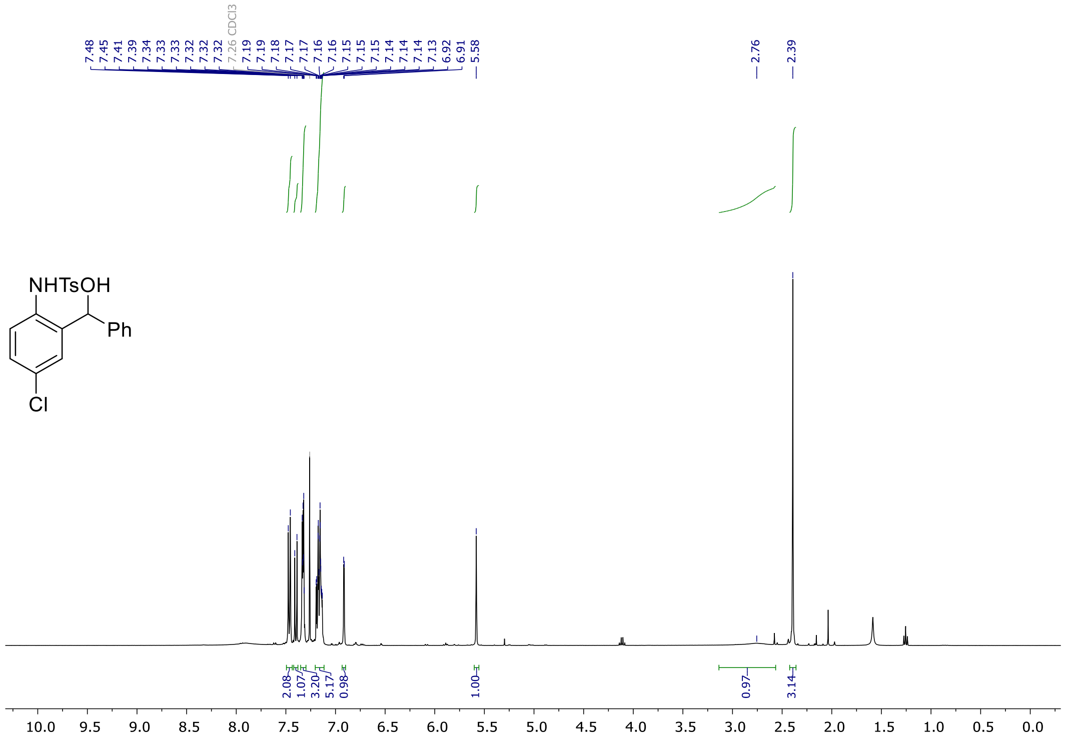


^{13}C NMR (101 MHz, $CDCl_3$)

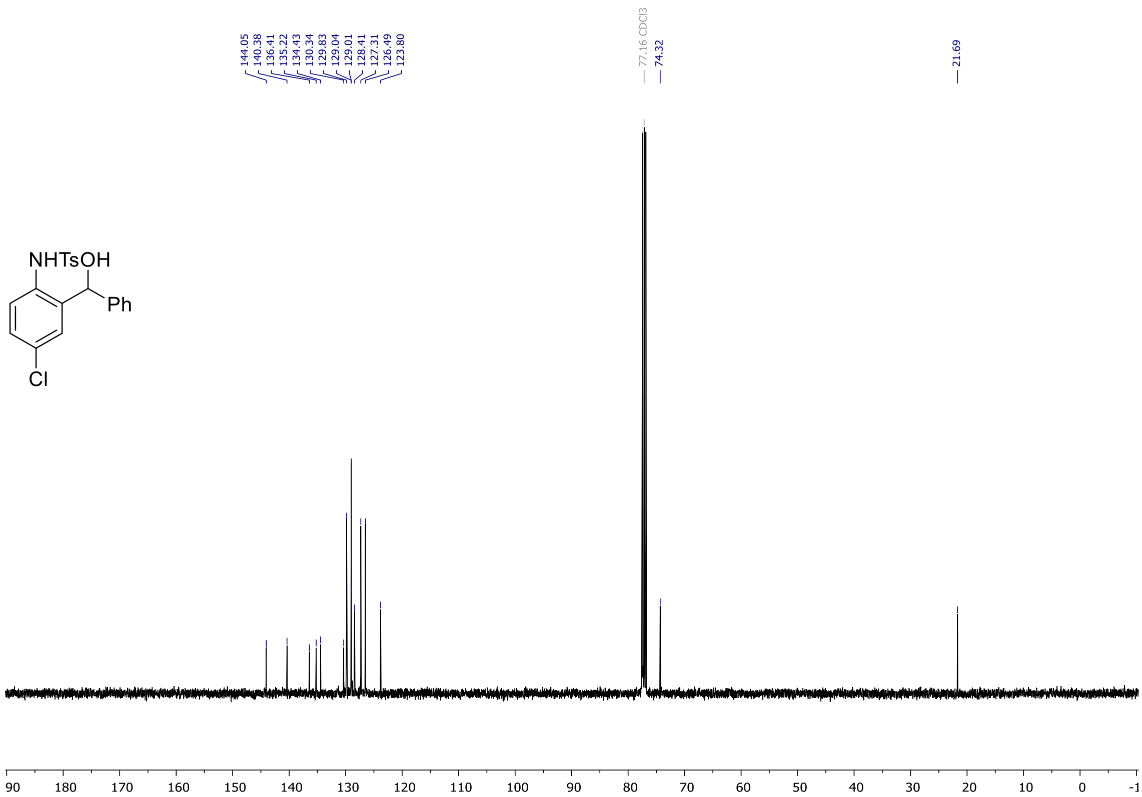


_N_-(5-chloro-2-(hydroxy(phenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1j’’’)

^{1}H NMR (400 MHz, $CDCl_3$)

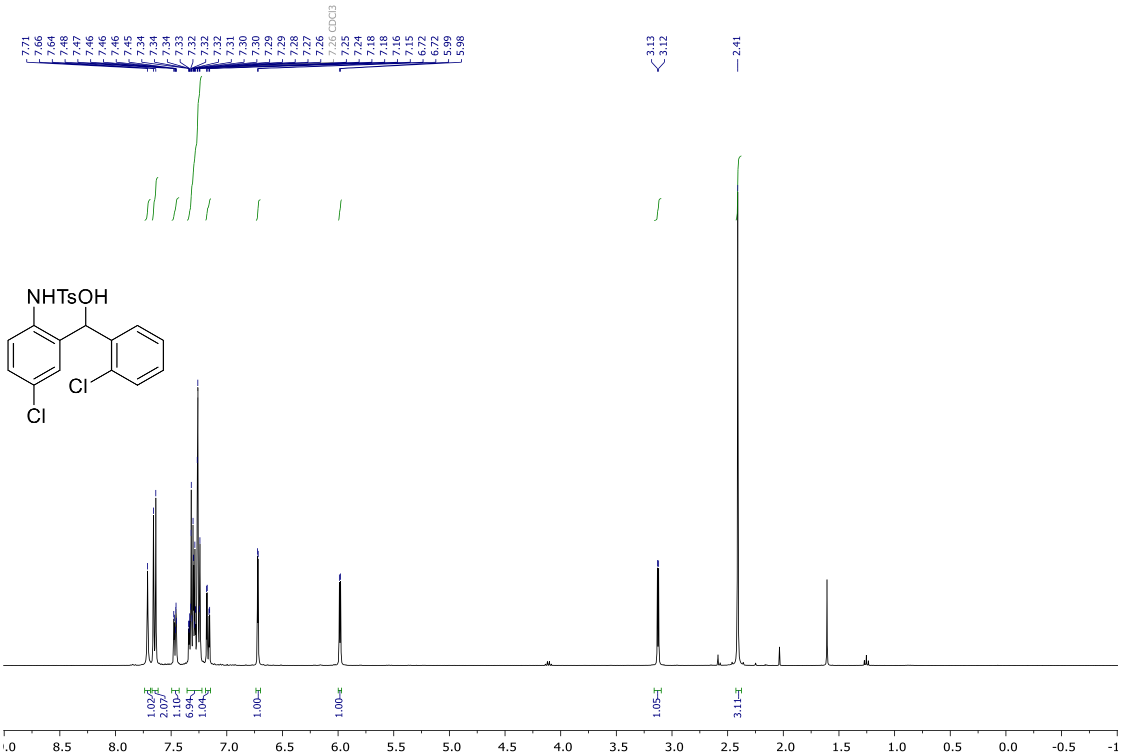


^{13}C NMR (101 MHz, $CDCl_3$)

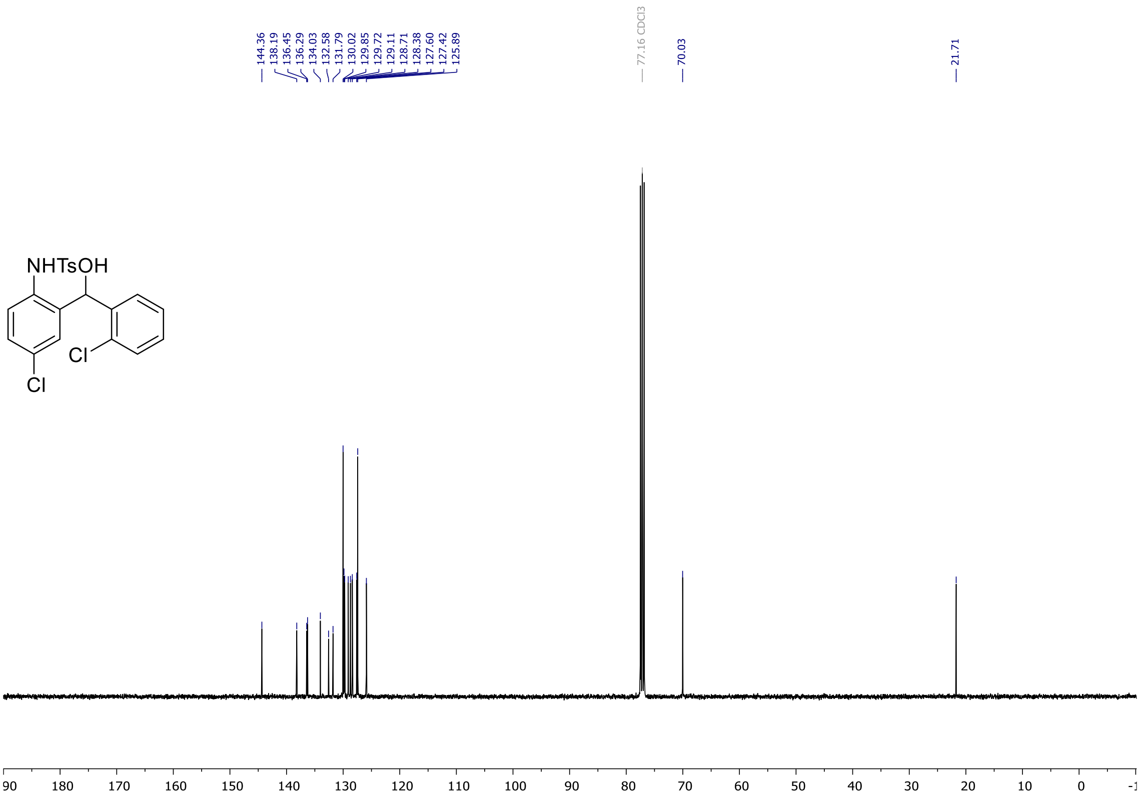


***N*-(5-chloro-2-((2-chlorophenyl)(hydroxy)methyl)phenyl)-4-methylbenzenesulfonamide (1k''')**

^{1}H NMR (400 MHz, $CDCl_3$)

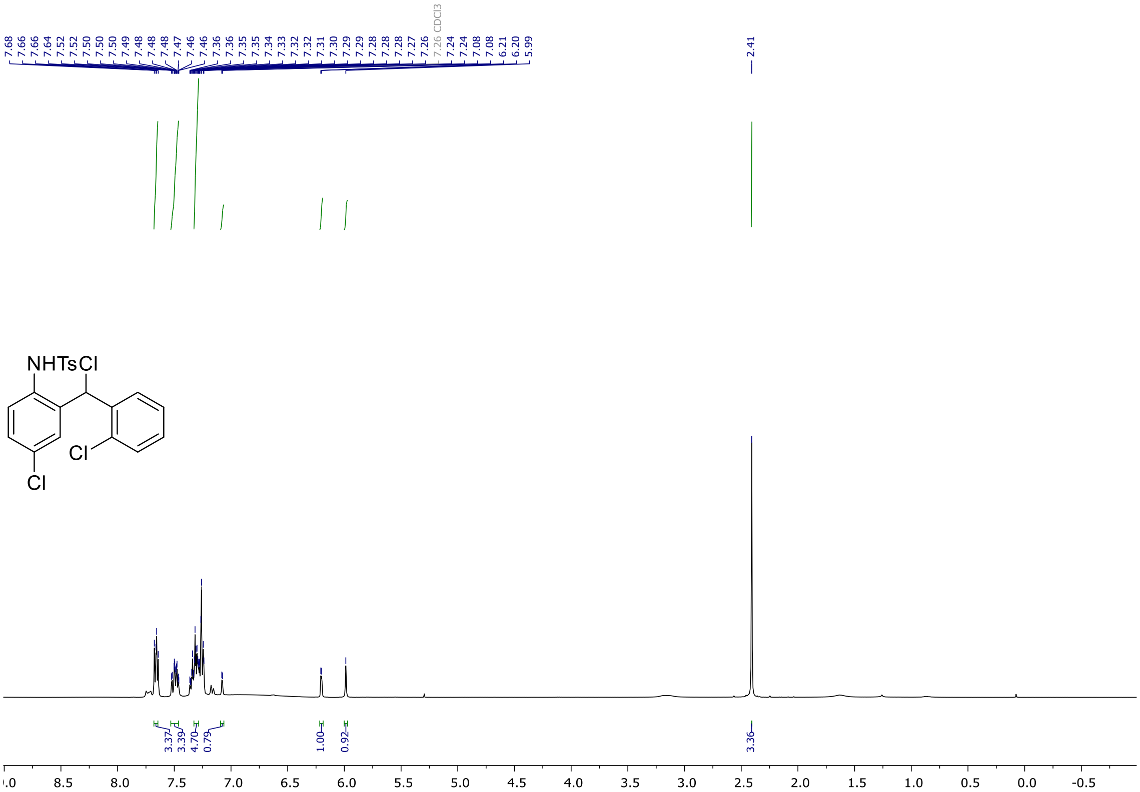


^{13}C NMR (101 MHz, $CDCl_3$)

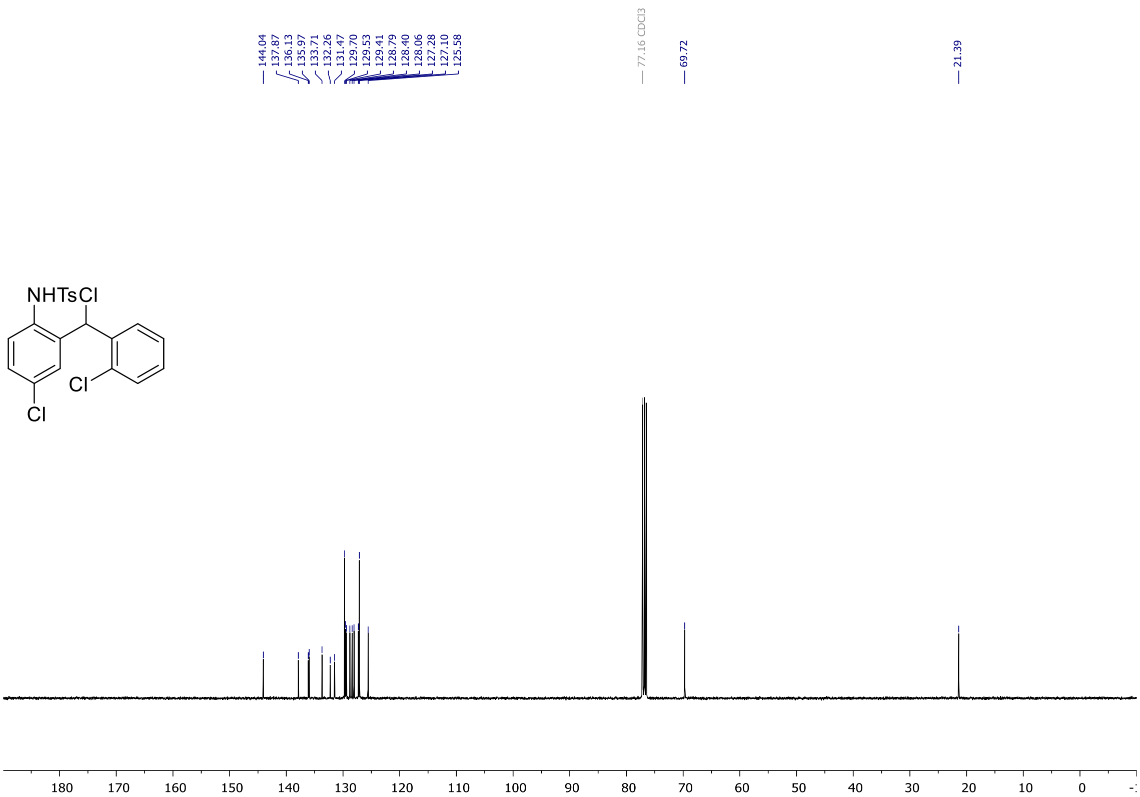


***N*-(5-chloro-2-(chloro(2-chlorophenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1k)**

^{1}H NMR (400 MHz, $CDCl_3$)

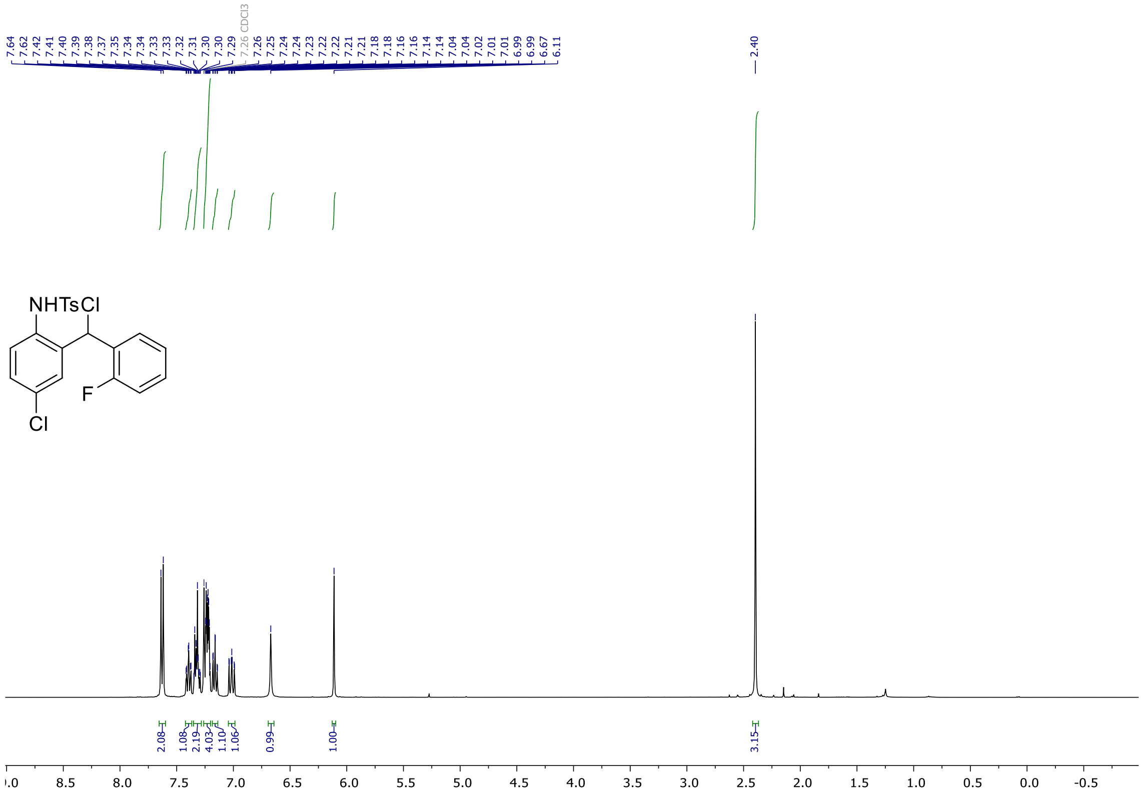


^{13}C NMR (101 MHz, $CDCl_3$)

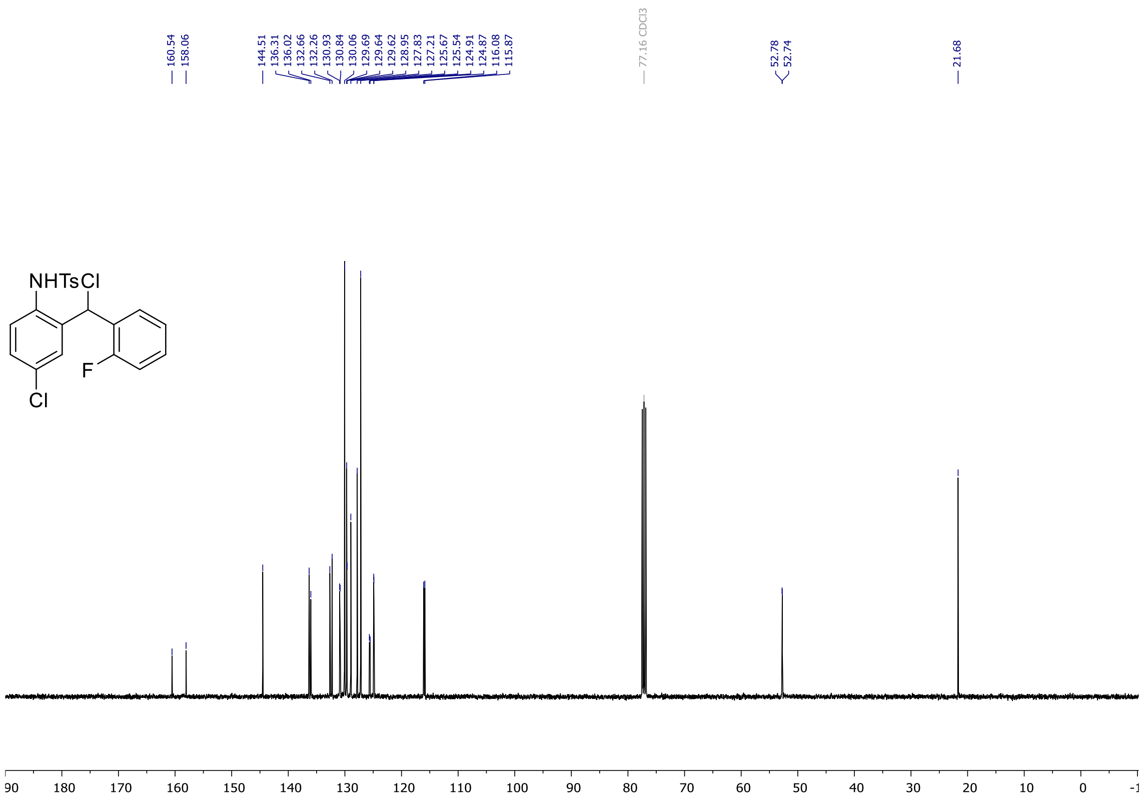


N-(5-chloro-2-(chloro(2-fluorophenyl)methyl)phenyl)-4-methylbenzenesulfonamide (1l)

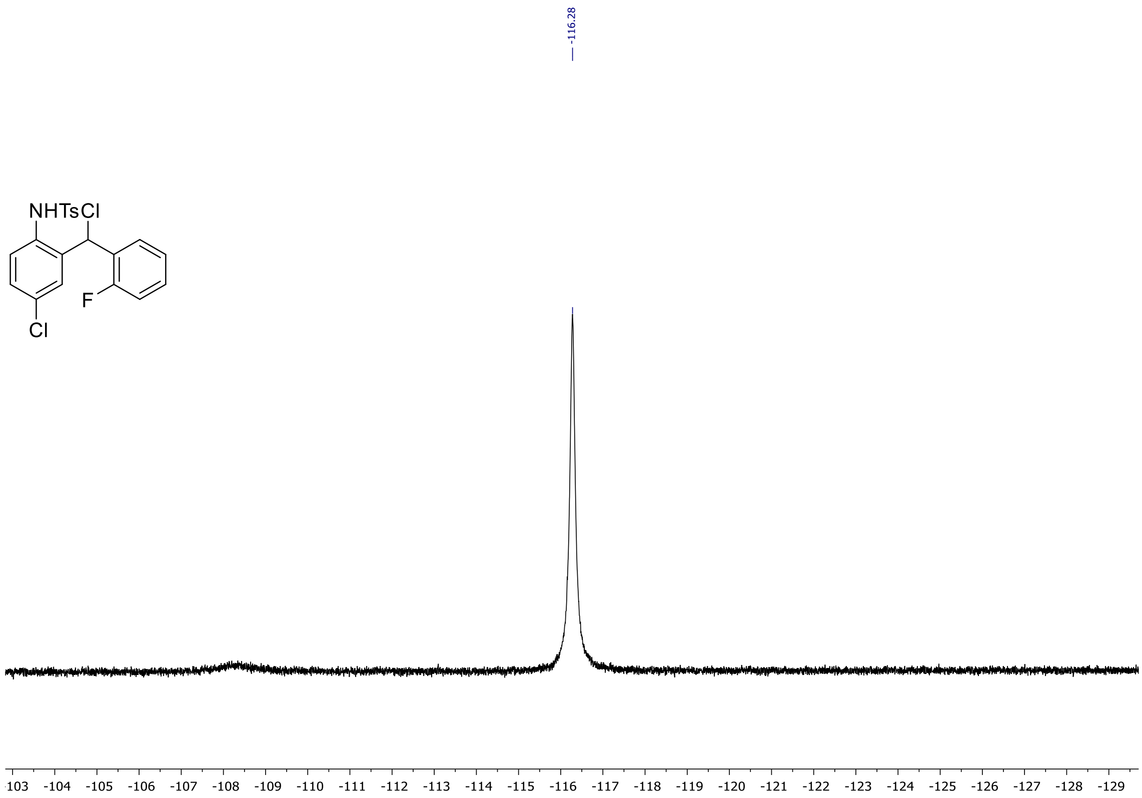
^{1}H NMR (400 MHz, $CDCl_3$)



^{13}C NMR (101 MHz, $CDCl_3$)



^{19}F NMR (376 MHz, $CDCl_3$)



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